Assessment of dietary practices and knowledge regarding dietary prevention of Non-Communicable Diseases among women aged 30 - 40 years in a rural block in Vellore, Tamil Nadu, India: a community based cross sectional study

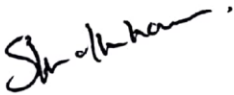A dissertation submitted in partial fulfillment of the requirement of

The Tamil Nadu Dr. M.G.R Medical University

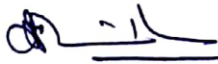For the M.D Branch XV (Community Medicine)

Examination to be held in May 2018

Certificate

This is to certify that 'Assessment of dietary practices and knowledge regarding dietary prevention of Non-Communicable Diseases among women aged 30 - 40 years in a rural block in Vellore, Tamil Nadu, India: a community based cross sectional study' is a bonafide work of Dr. S. Madhu Mohan, in partial fulfillment of the requirements for the M.D. Community Medicine examination (Branch XV) of the Tamil Nadu Dr. M.G.R. Medical University to be held in 2018.

Dr. Madhu Mohan. S

Post Graduate Student

M.D Community Medicine

University Registration No: 201525053

Community Health Department
632002

Christian Medical College,

Vellore 632002 Tamil Nadu, India

Dr. Anu Mary Oommen

Guide

Assoc. Professor

Department of Community Health

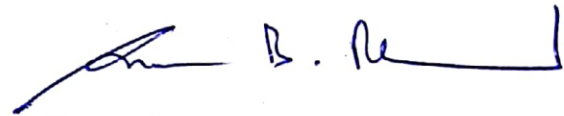Christian Medical College, Vellore

Tamil Nadu, India

Dr. Jasmin Helan Prasad, MD, Dip.NB, MPH

Professor and Head

Department of Community Health

Christian Medical College, Vellore 632002

Tamil Nadu, India

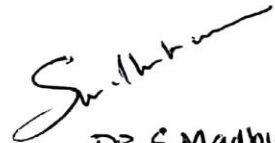Dr. Jasmin Helan, MBBS, MD, Dip.NB, MPH
Professor and Head

Principal

Christian Medical College, Vellore 632002

Tamil Nadu, India

Principal,
Christian Medical College,
Vellore - 632 002, INDIA

Declaration

I hereby declare that this dissertation titled 'Assessment of dietary practices and knowledge regarding dietary prevention of Non-Communicable Diseases among women aged 30 – 40 years in a rural block in Vellore, Tamil Nadu, India: a community based cross sectional study' is a bona fide record of my original research. It has not been submitted to any other university or institution for the award of any degree or Diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

DR. S. Madhu Mohan.

CERTIFICATE - II

This is to certify that this dissertation work titled 'Assessment of dietary practices and knowledge regarding dietary prevention of Non-Communicable Diseases among women aged 30 - 40 years in a rural block in Vellore, Tamil Nadu, India: a community based cross sectional study', is of the candidate Dr. S. Madhu Mohan, with registration Number 201525053, for the award of M.D in the branch of XV (Community Medicine). I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows 5 percentage of plagiarism in the dissertation.

Guide & Supervisor sign with Seal.

URKUND

Urkund Analysis Result

Analysed Document: Discussion orkund.docx (D31770820)
Submitted: 10/27/2017 3:27:00 PM
Submitted By: madhu88star@gmail.com
Significance: 5 %

Sources included in the report:

SOWMYA PH D FULL - FINAL.pdf (D24363781)
KAVITHADEVI.docx (D22718153)
Full Thesis_Mansi Chopra_Plag check.doc (D22444189)
http://www.who.int/mediacentre/factsheets/fs394/en/
https://www.nhp.gov.in/healthlyliving/healthy-diet

Instances where selected sources appear:

14

Acknowledgements

My *special thanks of gratitude* to Dr. Anu Mary Oommen for her patience, trust and kindness because of which this study could be completed. I thank Dr. Shalini for being understanding and providing me with utmost strength. I would like to thank and express my great appreciation to Dr. Jasmine Helan Prasad for her valuable and constructive suggestions during the planning and development of this research work and helping me through difficult times. I thank Dr. Venkata Raghava for his enthusiastic encouragement and Dr. Kurien George for his advice and guidance he has provided throughout. I thank all professors, assistant professors and faculty of the Community Health Department for helping and guiding me with knowledge and support. I am thankful for the assistance given by Mr. Yesudasan and Mr. Dharmalingam who helped and motivated me through every day of my data collection. I once again would like to appreciate Dr. Anu Mary Oommen for her generous patience. I would like to thank my mother Dr. Kokila Selvaraj for providing moral support.

Dedicated to my ever loving father without whom nothing would have been possible

Glossary of Abbreviations

NCD	Non-Communicable Diseases
CVD	Cardio Vascular Diseases
DALYs	Disability- Adjusted Life Years
NFHS	National Family Health Survey
WHO	World Health Organization
HIV	Human Immunodeficiency Virus
NNMB	National Nutrition Monitoring Bureau
RDA	Recommended Dietary Allowances
NIN	National Institute for Nutrition
ICMR	Indian Council of Medical Research
SFA	Saturated fatty acids
PUFA	Polyunsaturated fatty acids
PURE	Prospective Urban Rural Epidemiology
CHO	Carbohydrate
T2DM	type-2 diabetes mellitus
CURES	Chennai Urban and Rural Epidemiological Study
CHAD	Community Health and Development
HDL	High Density Lipoprotein
LDL	Low Density Lipoprotein
BMI	Body Mass Index
IDF	International Diabetes Federation
IDSP	Integrated Disease Surveillance Project
NSSO	National Sample Survey Organization

Tables of contents

Tables

Figures

1. Introduction

Changes in dietary patterns and standard of living occur when a country undergoes rapid urbanization and consequent migration of people from rural to urban areas in a short period. Improved socioeconomic status and better communication have surely improved the standard of living. These changes have also influenced dietary practices. While the diversity of available food has also increased especially in urban areas, some of the changes have not been for the better. Consumption of energy rich diet high in fats, especially saturated fats and fast foods is seen in urban areas. Even in rural India, items such as chaats and salty foods (such as namkeens, chips, sweets), are more easily available than healthy food options. Improper and inappropriate dietary practices are also on the rise among the urban poor, who have become the victims of poorly planned urbanization. The nutrition transition in poor countries has been considered an emerging crisis due to the effect on health (1). This transition, characterized by improvement in agricultural practices, increased supply of food and improvements in food processing technology, has resulted in increasing the availability of food. However, these developments have also resulted in imbalanced nutrient intake leading to adverse changes in health status (2). There has been an alarming rise of NCDs (Non-Communicable Diseases), such as cancer, diabetes, hypertension, stroke and other cardiovascular diseases (CVD). All these diseases lead to disability or an early death. Chronic diseases which occur partly due to improper nutrition, will also increase the economic burden on countries. This is either in terms of direct cost to people and governments or increasing disability- adjusted life years (DALYs) due to NCDs. Branding of these diseases as 'diseases of affluence' is no more correct as they occur both in poor countries and in poor people in richer countries.

The latest National Family Health Survey (NFHS 4, 2007) reported that the proportion of undernourished women was 36%. However, the proportion who were overweight /obese increased from 11% to 15% in 2015 since the previous survey in 2005 (3,4). There has been an increase in overweight/obesity in rural populations as well, especially in females (5). Malnutrition which includes both over and under nutrition is thus an important problem faced by developing countries. Dietary practices are dependent on the socio demographic characteristics of the population in question and vary from household to household. Thus, the knowledge regarding quantity and types of food consumed by a household helps us to evaluate the dietary practices of that household (6). The role of a healthy diet in preventing and controlling morbidity and premature mortality resulting from non-communicable diseases (NCDs) has been established through epidemiological studies. Furthermore, there is decreased energy expenditure through sedentary life styles, use of motorized transport, use of labor saving devices at home, disappearance of physically demanding manual task at work places etc., leading to decreased physical activity.

Farming is now highly mechanized and in a country like India that was predominantly agriculture-based, and people have started migrating to cities, primarily due to a declining role of agriculture in the rural economy. Policies and strategies for NCD prevention must focus on nutrition and healthy dietary habits, along with other risk factors like smoking and physical activity. It is therefore essential to understand the dietary pattern of various populations and the factors preventing them from following healthy diets. This study aimed to examine dietary practices, knowledge and determinants of the same among women aged 30-40 years from rural households in two villages in Kaniyambadi Block, Vellore, Tamil Nadu.

2. Justification

Branding chronic diseases as diseases of affluence is no longer correct as they occur both in poor countries and in the poor people in richer countries. This change is taking place at a faster rate in developing countries than in developed regions of the world.

Worldwide the expenditure incurred due to increased occurrence of NCDs will have impact on health, economic and social dimensions. Unhealthy lifestyles will add fuel to this problem. Chronic diseases, which are often partly due to diet and poor nutrition, will increase the public health burden, either in terms of direct costs to people and governments, or in terms of disability- adjusted life years (DALYs).

The nutrition transition in poor countries has been considered as an emerging crisis due to its adverse effects on health. The nutrition transition, characterized by improvement in agriculture, supply of food and recent improvement in food processing technology has resulted in increasing the availability of food for people, but has also resulted in imbalanced nutrient intakes leading to changes in health status (7). A typical example of changing health status is brought out from the nationwide surveys mapping the nutritional profile of women (NFHS, 2007). The proportion of undernourished women was 36%, while at the same time the prevalence of overweight /obesity increased from 11% to 15% (4). The double burden of malnutrition in India can be attributed to lifestyle changes and the nutrition transition. There is increasing prevalence of overweight /obesity in rural populations, especially in females (8). Many people in rural areas are dependent on cereals with little dietary diversity, leading to micronutrient deficiency. Dietary practices (types of foods consumed, variety and quality of food intake) are dependent on the socio demographic characteristics of the population in question, and vary from household to household. Knowledge

regarding type and amount of individual food items consumed by a household and the frequency of intake can help us to evaluate the dietary practices of that household.

Dietary diversity is one of the most commonly used indicators for evaluation of healthy dietary practices. Measurement of dietary diversity can be done using a simple count of food groups that a household or an individual has consumed over the preceding time frame, usually 24 hours. Dietary diversity can be measured at the individual level or household level. At the household level, dietary diversity is a measure of access to food, that is; capability of a household to obtain an adequate quality and quantity of food to meet all household members' nutritional requirements for productive lives; while at the individual level it refers to dietary quality, generally the micronutrient sufficiency of a diet. Therefore, obtaining information about the household dietary diversity in a society can serve as a useful indicator of assessing household food security.

Tamil Nadu, one of the southern states, which is comparable to Kerala with respect to many social and health indicators, has been facing a double burden of disease. Results of previous cross-sectional studies have shown that diabetes in rural areas of Vellore has increased from 3.6% in 1991-94 to 10.2% in 2010-12 and overweight/obesity from 8.5% to 27% (8). The prevalence of overweight/obesity among rural women aged 30 to 40 years was 32.1% in 2010-12. As women are predominantly involved in planning and preparing food especially in rural households, it is therefore vital to target women for any dietary intervention programs. This cross-sectional study, in addition to assessing dietary practices will also serve as a baseline evaluation of dietary practices and knowledge, in preparation for a dietary intervention program in this area.

This study aims to measure food patterns of individuals and household and document socio-demographic, and economic factors that could influence the observed dietary practices. This will provide reliable information to plan suitable intervention strategies and suggestions for action.

The dietary intervention program which will be designed using the results of this study will serve as a pilot program for implementing a primary prevention program in this rural block.

3. Objectives

The objectives of the study were:

1. To measure per-capita consumption of salt, sugar and oil among women aged 30 to 40 years of age in two villages in Kaniyambadi, a rural block in Vellore district and the association with selected risk factors.

2. To measure dietary intake of fruits and vegetables, total calories, proportion of calories from fats and carbohydrates among women aged 30 to 40 years of age in the selected villages and the association with selected risk factors.

3. To study the prevalence of hypertension, diabetes, metabolic syndrome and overweight/obesity among the selected women in the age group of 30 to 40 years.

4. To study the relationship between unhealthy dietary practices and hypertension, diabetes, metabolic syndrome and overweight/obesity among the selected women.

4. Review of literature

4.1 Epidemiological transition

During the past few years, there has been an increasing burden of Non-Communicable Diseases (NCDs), with adults dying prematurely of NCDs. An *epidemiological transition* has been occurring worldwide. The epidemiologic transition is that process by which the pattern of mortality and disease is transformed from one of high mortality among infants and children and episodic famine and epidemics affecting all age groups, to one of degenerative and man-made diseases (such as those attributed to smoking) affecting principally the elderly (7).

One reason for this is the rapid demographic transition with increasing proportion of the adult and older population even in low and middle-income countries. About 60 million deaths occur worldwide every year, out of which 46 million deaths occur in low and middle-income countries (9). The World Health Organization (WHO) forecasts that within the next few years there will be dramatic changes in health needs of these countries as a result of the epidemiological transition (10). The death rate due to NCDs is expected to double in developing countries by 2020. Thus, most low and middle-income countries are dealing with a dual burden of infectious diseases especially among children on one hand and premature chronic and degenerative diseases among adults on the other hand. Hence, it is difficult for policy makers to address the diverse needs of the population. The human immunodeficiency virus (HIV) epidemic, violence, injury, and civil unrest have added fuel to the existing problem in developing countries. The main difference in the patterns of mortality in developed and developing regions is the high proportion of premature deaths due to external causes of death, primarily homicides, suicides, road traffic crashes, and poisoning among youth and adult population. It is estimated that half the disease burden in low-

and middle-income countries is due NCDs and 21% of deaths in these countries are due to cardiovascular diseases (11).

The incidence of cancer in such countries is also high. In the year 2000, 80% of new cases of cervical cancer occurred in the developing world and it is estimated that 56% of all cancer deaths occur in developing countries (12,13).

4.2 Epidemiological transition in India

Results from various studies show that, because of the current phase of demographic and epidemiological transition, the pace of 'India's Health Transition' has been changed. Health transition has occurred in all areas where there has been an increase in morbidity, in spite of decrease in crude death rate. The rise in occurrence of NCDs have been related with risk factors such as lack of physical activity, consumption of tobacco, insufficient intake of fruits and vegetables, overweight, obesity and so on.

At present the epidemiological transition in India is characterized by low death rate, increased morbidity, and by increased burden of both communicable diseases and NCDs. These patterns of mortality and morbidity trends imply that India is facing a major contrast in the process of epidemiological transition. Among developing countries India occupies a unique place not only because of its population size but also due to complex health problems. India reports about 9.5 million deaths a year, which is about one in six of total deaths worldwide. Like any other developing country, India is also undergoing rapid epidemiological transition and change in the death pattern because of its socioeconomic and demographic changes. The crude death rate in India was 12.5 (per 1000) in 1981, which was reduced to 7.2 (per 1000) in 2010. Epidemiological

transition in India is characterized by "Age of Receding Pandemics and the Age of Degenerative and Man-Made Diseases" (14).

Among the various states, Tamil Nadu ranks 'fourth highest' in terms of life expectancy at birth, 'second lowest' next only to Kerala in terms of infant mortality rate and birth rate, 'third lowest' in terms of maternal mortality rate and 'tenth lowest' in terms of death rate. Diseases like small pox, polio and guinea worm have been eradicated. A study done in Tamil Nadu revealed that the prevalence of pre-hypertension was 43%, stage 1 and stage 2 hypertension was 20%, overweight was 23% and central obesity was 25%. The prevalence of various risk factors for NCD were 11% alcohol consumption, 20% smoking, 99% low fruit and vegetable consumption (less than 5 servings) and 66% low physical activity (15).

According to the National Family Health Survey (NFHS) 4, 6.8% of women use tobacco in any form and only 1.2% consume alcohol (4).

4.3 Nutritional status of adults in India

Data from NFHS shows that at least 22% of women and 20 percent of men are undernourished, with a body mass index (BMI) less than 18.5 kg/m^2, indicating a high prevalence of nutritional deficiency. Overweight and obesity are emerging problems in India (4). Twenty percent of women and 18.6 percent of men are overweight or obese. The simultaneous occurrence of over nutrition and under nutrition indicates that adults in India are suffering from a dual burden of malnutrition (16). The most common nutritional problems of public health importance in India are low birth weight, protein energy malnutrition in children, and chronic energy deficiency in adults, micronutrient malnutrition and diet-related NCDs.

4.4 Diet and health among adults

Nutrition is one of the basic human needs that is important for a healthy living. A healthy diet is important as early as during intrauterine period for proper growth, development and to remain active. Food provides nutrients to body and supply other components (non-nutrient phytochemicals) which produce a positive impact on health. Since people consume food, it is important to advocate nutrition in terms of foods rather than nutrients. For attaining optimal nutritional status, emphasis should be shifted from a nutrient orientation to the food-based approach.

 Overgrowth of population, changes in demography, fast urbanization and alterations in traditional belief and habits leads to the development of certain unhealthy dietary practices and physical inactivity, resulting in diet-related long-term diseases. India has been classified as a country with a lower middle income, with per capita GNP of US $ 996-39451 by the World Bank. Among 209 countries it ranks 160th in terms of human development. Among the Indian population, about 28% in the rural and 26% in the urban areas are estimated to be below the poverty line (17).

4.5 Nutrition transition:

The **''nutrition transition**'' include both quantitative and qualitative changes in the diet. The harmful dietary changes include changes in the structure of the diet towards a higher energy density with more of fat and added sugars, higher intake of saturated fat (mostly from animal sources), reduced intake of complex carbohydrates and dietary fiber, and reduced intake of fruits and vegetables (18).

Diets evolve over time and are influenced by many factors and complex interactions. Economic factors like income and prices, individual choices and beliefs, cultural factors, as well as

geographical, environmental factors, social factors and all interact in a complex manner and alter the dietary consumption patterns (19).

National Nutrition Monitoring Bureau (NNMB) surveys

National Nutrition Monitoring Bureau (NNMB) surveys reported that in Indian households the daily intake of all foods except cereals and millets is lower than the Recommended Dietary Allowances or RDA (Table 1). The consumption of pulses and legumes like green gram, Bengal gram and black gram, which are important source of protein, was less than 50% of RDA. Consumption of green leafy vegetables (<14g) and other vegetables (43 g) was less. They contain micronutrients like beta-carotene, folate, calcium, riboflavin and iron. Consumption of visible fat was also less than 50% of the RDA (20).

Table 1: Recommended daily food Consumption (g/day)

	Intake	Intake per capita	Recommended Daily Allowance (RDA)[#]
Cereals/millets	396	345	400
Pulses	28	24	80
Milk	82	71	300
Vegetables	49	43	300
Oils	14	12	30

Source: National Nutrition Monitoring Bureau, 2006 (14) # RDA -2010 for moderately active person.

The households with energy inadequacy were about 70%, and with protein inadequacy was about 27%. Thus, in the cereal/millet-based Indian diet, the real problem is energy inadequacy and not protein. This dietary energy gap can be easily compensated by the poor by increasing the quantities of habitually eaten local foods (20).

4.6 Balanced diet:

A balanced diet provides all the nutrients in required amounts and proper proportions. This can be obtained through a blend of the four basic food groups. The quantities of foods required to provide the nutrient requirements vary with age, gender, physiological status and level of physical activity. A balanced diet should provide around 50-60% of total calories from carbohydrates, preferably from complex carbohydrates, about 10-15% from proteins and 20-30% from both visible and invisible fat (20)

Figure 1 Food pyramid showing a balanced diet (source: NIN, Hyderabad, 15)

Apart from this, a balanced diet should supply other non-nutrients such as dietary fiber, antioxidants and phytochemicals that have positive health benefits. Antioxidants such as vitamins C and E, beta-carotene, riboflavin and selenium safeguard the human body from free radical damage. Other phytochemicals such as polyphenols, flavones, etc., also protect the body against

oxidant damage. Spices like turmeric, ginger, garlic, cumin and cloves are rich sources of antioxidants(20). Normal diet, to be complete and should include fresh vegetables and fruits.

4.6.1 Dietary Goals (21)

The **dietary goals and guidelines** recommended by NIN, Indian Council of Medical Research, Hyderabad are given below:

1. Maintenance of a state of positive health and optimal performance in populations at large by maintaining ideal body weight.

2. Ensuring adequate nutritional status for pregnant women and lactating mothers.

3. Improvement of birth weights and promotion of growth of infants, children and adolescents to achieve their full genetic potential

4. Achievement of adequacy in all nutrients and prevention of deficiency diseases

5. Prevention of chronic diet-related disorders.

6. Maintenance of the health of the elderly and increasing the life expectancy.

4.6.2 Dietary Guidelines (21)

Correct nutritional behavior and dietary choices are needed to achieve dietary goals. The following dietary guidelines provide a broad framework for appropriate action:

1. Eat variety of foods to ensure a balanced diet.
2. Ensure provision of extra food and healthcare to pregnant and lactating women.
3. Promote exclusive breastfeeding for six months and encourage breastfeeding till two

years or as long as one can. Feed home based semi solid foods to the infant after six months ensure adequate and appropriate diets for children and adolescents, both in health and sickness.

4. Feed home based semi solid foods to the infant after six months.

5. Ensure adequate and appropriate diets for children and adolescents, both in health and sickness.

6. Eat plenty of vegetables and fruits.

7. Ensure moderate use of edible oils and animal foods and very less use of ghee/butter.

8. Avoid overeating to prevent overweight and obesity.

9. Exercise regularly and be physically active to maintain ideal body weight.

10. Restrict salt intake to minimum.

11. Ensure the use of safe and clean foods

12. Adopt right pre-cooking processes and appropriate cooking methods.

13. Drink plenty of water and take beverages in moderation.

14. Minimize the use of processed foods rich in salt, sugar and fats.

15. Include micronutrient-rich foods in the diets of elderly people to enable them to be fit and active.

4.6.3 The WHO recommendations for healthy diet (19)

A healthy diet protects against malnutrition in all its forms and non-communicable diseases (NCDs), including diabetes, heart disease, stroke and cancer. Unhealthy diet and sedentary lifestyle are risk factor for poor health.

Healthy dietary practices should start early in life – breastfeeding promotes healthy growth and cognitive development, and has longer-term benefits like reducing the risk of becoming overweight or obese and NCDs later in life.

Energy intake (calories) should be in balance with energy expenditure. Total fat should not exceed 30% of total energy intake and fat consumption should be away from saturated fats to unsaturated fats, and no trans fats (19).

Limit the intake of free sugars to less than 10% of total energy intake. Reduction to less than 5% of total energy intake is recommended for additional health benefits (19).

Salt intake should be restricted to less than 5 g per day, which prevents hypertension and heart disease and stroke in the adult population (19).

WHO Member States have agreed to restrict the global population's intake of salt by 30% and halt the rise in diabetes and obesity in adults, adolescents as well as in childhood overweight by 2025.

4.6.3.1: A healthy diet for adults contains:

- Fruits, vegetables, legumes (e.g. lentils, beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat, brown rice).
- At least 400 g (5 portions) of fruits and vegetables a day (22). Potatoes, sweet potatoes, cassava and other starchy roots are not classified as fruits or vegetables.

- Less than 10% of total energy intake from free sugars (22),(23) which is equivalent to 50 g (or around 12 level teaspoons) for a person of healthy body weight consuming approximately 2000 calories per day, but ideally less than 5% of total energy intake for additional health benefits (23). Most free sugars are added to foods or drinks by the manufacturer, cook or consumer, and can be found in sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.

- Less than 30% of total energy intake from fats (19),(24). Unsaturated fats (e.g. found in fish, avocado, nuts, sunflower, canola and olive oils) are preferable to saturated fats (e.g. found in fatty meat, butter, palm and coconut oil, cream, cheese, ghee and lard) (25). Industrial trans fats (found in processed food, fast food, snack food, fried food, frozen pizza, pies, cookies, margarines and spreads) are not part of a healthy diet.

- Less than 5 g of salt (equivalent to approximately 1 teaspoon) per day (6) and use iodized salt.

4.7: Fruits and vegetables

Eating at least 400 g or 5 servings of fruits and vegetables per day reduces the risk of NCDs (19), and helps ensure an adequate daily intake of dietary fibre.

Advantages of eating vegetables/fruits

Fresh vegetables and fruits are rich sources of micronutrients and macronutrients. Minerals (like iron and calcium) and vitamins (like vitamin C, folic acid, B complex vitamins and carotenoids) are the micronutrients whereas the complex carbohydrates/fiber are the macronutrients present in vegetables and fruits. They also contain more amounts of iron, calcium, vitamin C, folic acid, carotenoid and phytochemicals (21).

4.8: Fats:

Fats provide energy, essential fatty acids and helps in absorption of fat-soluble vitamins. Fats are precursors of biologically active compounds in the body. Fats/oils increase the satiety also. Excessive use of plant and animal-based fats raise blood lipids, cholesterol and triglycerides and promote blood clotting. They increase the risk of coronary heart disease and other illnesses like obesity, heart disease, stroke and cancer.

Reduce the total fat intake **to less than 30% of total energy** intake, which prevents unhealthy weight gain in the adult population. The risk of developing NCDs is also lowered by reducing saturated fats to **less than 10%** of total energy intake, and **trans fats to less than 1%** of total energy intake, and replacing both with unsaturated fats (26).

The physiological/health implications of different fats/fatty acids

Saturated fatty acids (SFAs) increase serum total and LDL-cholesterol levels, reduce insulin sensitivity, enhance thrombogenicity, and increase the risk of cardiovascular diseases. Hence, SFA intake should not exceed 8-10% of total energy (26). Instead of whole milk, skimmed milk should be consumed. Strictly limit the consumption of butter and cheese. Polyunsaturated fatty acids particularly n-3 PUFA are anti atherogenic because they increase the insulin sensitivity, increase the peripheral glucose utilization and decrease adiposity. As compared to linoleic acid, alpha-linoleic (n-3) acid is more beneficial for prevention of inflammation and accumulation of fatty material in blood vessels thereby prevent atherosclerosis and clotting of blood. The long chain n-3 PUFA of fish oils and micro algae have greater antiatherogenic, antithrombotic and anti-inflammatory effects than alpha-linolenic (n-3) acid of plant foods.

4.8.1: Choice of cooking oils

An ideal quality fat is essential for good health. To maintain a balance, a ratio of polyunsaturated/ saturated (PUFA/ SFA) of 0.8-1.0, and linoleic/ a-linolenic (n-6/ n-3) of 5-10 should be present in the total diet. For ensuring this correct balance of fatty acids in cereal-based diets, the choice of cooking oil should be as follows (21):

- Groundnut or Sesame or Rice bran+ Mustard oil

- Groundnut or Sesame or Rice bran+ Canola oil

- Groundnut or Sesame or Rice bran+ Soya bean oil

- Palmolein + Soya bean oil

- Safflower or Sunflower + Palmolein + Mustard oil

The population nutrient intake goals (WHO) with respect to dietary fats is shown in Table 2.

Table 2: Ranges of population nutrient intake goals with respect to fats (24)

Dietary factor	Goal (% of total energy, unless otherwise stated)
Total fat	15--30% (a)
Saturated fatty acids	<10%
Polyunsaturated fatty acids (PUFAs)	6--10%
n-6 Polyunsaturated fatty acids (PUFAs)	5--8%
n-3 Polyunsaturated fatty acids (PUFAs)	1--2%
Trans fatty acids	<1%
Cholesterol	<300 mg per day

Total fat = saturated fatty acids + polyunsaturated fatty acids + trans fatty acids

4.9: Salt, sodium and potassium

Many people consume too much sodium through salt (corresponding to an average of 9–12 g of salt per day) (27) and not enough potassium. High salt consumption and insufficient potassium intake (less than 3.5 g) contribute to high blood pressure, which in turn increases the risk of heart disease and stroke. It has been shown that 1.7 million deaths could be prevented each year if salt consumption were reduced to less than 5 g per day (28).

People are often unaware of the amount of salt they consume. In many countries, most salt comes from processed foods (e.g. ready meals; processed meats like bacon, ham and salami; cheese and salty snacks) or from food consumed frequently in large quantity (e.g. bread). Salt is also added to food during cooking (e.g. soy sauce and fish sauce) or at the table (e.g. table salt)

4.9.1: The health problems associated with excessive salt/sodium intake.

There is an association between salt intake and blood pressure. Salt intake higher than 8 g/day is considered as a risk factor for hypertension. Prevalence of hypertension is low in populations consuming less than 3 g salt per day (28). The usual increase in blood pressure with age is also not seen with such low intakes. Drastic restriction of dietary salt decreases the risk of hypertension. Potassium-rich foods such as fresh vegetables and fruits decrease the blood pressure. It is the ratio of sodium to potassium in the diet is important. Salt intake in our population is generally is high. It should not be more than 6 g per day. Excessive salt may also affect stomach mucosa and result in atrophic gastritis and gastric cancer. Higher sodium intake leads to greater calcium excretion, which may result in reduction in bone density (21).

4.10: Sugars

The intake of free sugars should be restricted throughout the life. Both in adults and children, the intake of free sugars should be reduced to less than 10% of total energy intake, and that a reduction to less than 5% of total energy intake provides additional health benefits (19). Free sugars are all sugars added to foods or drinks by the manufacturer, cook or consumer, as well as sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates. Consuming free sugars increases the risk of dental caries (tooth decay) and unhealthy weight gain, which can lead to overweight and obesity.

4.11: Diet, nutrition and the prevention of chronic diseases through the life course approach

The increasing occurrence of chronic diseases is an important determinant of public health in the world. Moreover 79% of deaths due to chronic diseases are occurring in developing countries, particularly in middle aged men (24). Many researches have proved that chronic disease risks begin in fetal life and continue into old age (29). Long-term adult disease, therefore, reflects collective various lifetime exposures to damaging physical and social environments.

For these reasons, a **life-course approach is utilized to** tackle the problem of chronic diseases. In the progression of life from one stage to another five **stages were identified for convenience**. These are **fetal development and the maternal environment; infancy; childhood and adolescence; adulthood; and ageing and older people** (21)**.**

Within the life-course approach, the adult phase of life is very crucial since it is the period during which most chronic diseases are not only expressed, as well as being the critical time for the preventive measures to be adopted (30).

There are evidences of association between cardiovascular disease or diabetes and the major ''adult'' risk factors, such as tobacco use, obesity, physical inactivity, cholesterol, high blood pressure and alcohol consumption (31). The factors that have been proved to lead to an increased risk of coronary heart disease, stroke and diabetes are: hypertension for CHD or stroke (32),(33), high cholesterol for CHD (34) (35) and tobacco use for CHD (36). Most of the studies are from developed countries, but supporting evidence from developing countries is beginning to emerge, for example, from India (37).

There are interactions **between early and later factors throughout the life** course. There are also **clustering of various risk factors**. Impaired glucose tolerance and dyslipidemia are seen as early as childhood and adolescence. They are typically clustered together with higher blood pressure and associate strongly to obesity, in particular central obesity in later life (38) (39) (40) (41).

There are also intergenerational effects playing an important role. Young adolescent girls who are malnourished become stunted women and they are more likely to give birth to low-birth-weight babies. Again, these babies continue the cycle by being stunted in adulthood, and so on (42).

There are also gene-nutrient interactions and genetic susceptibility. There are evidences that nutrients and physical activity influence gene expression and have shaped the genome over several million years of human evolution. There are many studies conducted on the role of nutrients in gene expression; for example, researchers are currently trying to understand why omega-3 fatty acids suppress or decrease the mRNA of interleukin, which is elevated in atherosclerosis, arthritis and other autoimmune diseases, whereas the omega-6 fatty acids do not (43). Studies on genetic variability to dietary response indicate that specific genotypes raise cholesterol levels more than others do. A recent study of the relationship between folate and cardiovascular disease revealed

that a common single gene mutation that reduces the activity of an enzyme involved in folate metabolism (MTHFR) is associated with a moderate (20%) increase in serum homocysteine and higher risk of both ischemic heart disease and deep vein thrombosis (44).

4.12: Studies on intake of macronutrients and cardiovascular disease and mortality

Prospective Urban Rural Epidemiology **(PURE) study** is a large epidemiological cohort study of individuals aged 35–70 years (2003-2013) in 18 countries, with a median follow up of 7·4 years (45). Dietary intake of 135, 335 subjects were obtained using validated food frequency questionnaires. The primary outcomes were total mortality and major cardiovascular events (fatal cardiovascular disease, non-fatal myocardial infarction, stroke, and heart failure). Secondary outcomes were all myocardial infarctions, stroke, cardiovascular disease mortality, and non-cardiovascular disease mortality. Participants were categorized into quintiles of nutrient intake (carbohydrate, fats, and protein) based on percentage of energy provided by nutrients. The association between consumption of carbohydrate, total fat, and each type of fat with cardiovascular disease and total mortality was assessed. High carbohydrate intake was associated with higher risk of total mortality, whereas total fat and individual types of fat were related to lower total mortality. Total fat and types of fat were not associated with cardiovascular disease, myocardial infarction, or cardiovascular disease mortality, whereas saturated fat had an inverse association with stroke (45).

4.12.1: Study on diet and diabetes mellitus

STARCH study was conducted to assess the dietary total and complex carbohydrate (CHO) contents in type-2 diabetes mellitus (T2DM) participants in India. A total of 796 participants (Asian) were enrolled in this study (385, T2DM and 409, non-T2DM). The mean of total calorie

intake per day was 1547 Kcal and 2132 Kcal respectively for T2DM and non-T2DM groups. CHO constituted 64.1% of total energy from diet in T2DM participants, higher than that recommended in India (46).

4.12.2: (CURES) Chennai Urban and Rural Epidemiological Study conducted in rural Tamil Nadu showed that the prevalence of obesity was 27.4% and abdominal obesity was 14%.The median energy intake was 2034 kcal and 78.1% of the calories was supplied by CHO. The main supply of calories was from refined cereals, particularly polished rice. Also 45% of population did not meet the recommendation for protein intake by the WHO because of poor intake of pulses, flesh foods and dairy products. More than half (57%) of them exceeded the salt limit, 99% did not WHO recommendation of fruits and vegetables and 100% did not meet n-3 PUFA recommendation (47).

4.13: Strategies to promote healthy dietary habits

The systematic review evidence for the effectiveness of health promotion strategies to improve dietary habits includes findings from both qualitative and quantitative methods. There are various types of intervention available such as (48):

1. Awareness campaigns 2. Multi-component interventions 3. Interventions using behavior change techniques 4. Interventions using messaging 5. Interventions using financial incentives 6. Interventions designed for specific settings 7. Theory-based interventions.

Awareness campaigns; Most awareness campaigns comprise "the development and communication of general healthy eating messages directed at the public", with the intention of raising awareness about healthy eating. Assessing the impact of such campaigns is technically difficult and resource intensive.

Multi-component intervention; multi-component interventions combining increased availability of fruit and vegetables, school-based nutrition education and parental involvement can increase fruit and vegetable intake (49).

Behavior Change Techniques; the most consistent finding in the evidence for health promotion strategies to improve healthy eating is that behavioral change techniques.

Interventions using messaging; an innovative approach to change eating behaviors is to induce change through messaging. Messaging communications do not include face-to-face encounters, but may include counseling, automated generic messages or tailored messages delivered via print mail, telephone, email or cell phone text messages.

Interventions using financial incentives: Another strategy to improve healthy eating is to use financial incentives to induce consumers to change their spending habits and thus their eating patterns.

Interventions designed for specific settings: A body of research-based evidence focuses on the promotion of healthy eating in specific settings, mainly school settings targeting children and youth and work settings targeting adults.

Theory-Based interventions: The literature on health promotion, in general, includes a hard-to-define category of systematic reviews that assess the contributions that specific theoretical models or frameworks make to a range of behavior change outcomes.

5. Methodology

5. 1 Study design

The study design was a population based cross sectional study. This study was carried out as a baseline assessment for a dietary intervention program being planned by the department for rural women aged 30 to 40 years.

5.2 Study period

October 2016 - September 2017.

5.3 Study setting

The study was carried out in two clusters (villages) namely village A and village B in Kaniyambadi block, Vellore District, Tamil Nadu.

The Community Health Department, Christian Medical College, Vellore, India, has been working in Kaniyambadi block for the past 60 years. This region is in the southern state of Tamil Nadu and is a geographically defined area of 127.4 sq. km with an estimated population of 1,15,384. The Community Health and Development program (CHAD) of the Community Health Department operates in all 82 villages in the block. The predominant occupations are agricultural labor and manual non-agricultural labor.

The health information system of the CHAD program has information on all permanent residents of this block. A female health worker (health aide), a public health nurse (a graduate nurse) and a doctor collect the information. The health workers are women who were educated at least till high school and received a one-year training before recruitment. Every week the health worker reports pregnancies, deliveries, births, deaths, morbidity and marriages in the village. This information is verified by the nurse and subsequently by the doctor. Periodical updating of the census is also done.

Monthly mobile clinics are held in each village, by a team consisting of a doctor, a public health nurse and a health worker. Patients with chronic diseases such as diabetes and hypertension are seen in these clinics and given medications. If any person requires a referral to a higher centre, they are referred to the secondary level base hospital. The base hospital is a 135-bedded hospital with out-patient clinics, a weekly diabetic clinic, monthly diabetic retinopathy clinics, labour room, surgical theatre and laboratory facilities.

5.4 Study participants

Rural women aged 30-40 years were chosen as the participants for this study as a dietary health education intervention is being planned for this age group.

5.5 Inclusion criteria:

- Women aged 30 to 40 years who are permanent residents of Kaniyambadi block

5.6 Exclusion criteria:

Women with the following conditions were excluded from the study:

- Pregnant at the time of interview
- Bedridden and those with severe co-morbidities affecting normal oral intake/diet

5.7 Sample size calculation

The number of participants needed to estimate per capita salt intake was calculated using the formula:

$4\ SD^2/d^2$

where SD (standard deviation) was taken as 4 g/day* and absolute precision d as 1 g/day

N = 64

Assuming a design effect of 2, final sample size was 128. As it is planned to conduct dietary intervention programs in these villages in the future, it was decided to take 128 in each of the two villages.

*based on the study 'Prevalence of hypertension and its association with dietary practices in a rural area of Ranchi district of Jharkhand' Indian Journal of Community Health 26(6):209-215 (50).

5.8 Sampling technique

Two villages (clusters) were purposively selected for the study. The decision was based on assessment of the co-operation of the village leaders and availability of volunteers who can help with delivering a dietary intervention program.

According to the census data maintained by Health Information System of CHAD (Community Health and Development) program of the Community Health Department for village A, there were 142 women aged 30 to 40 years. Using a table of random numbers, 130 women in this village were selected to participate in this study. In village B, there were 385 women who were eligible to participate and hence every alternate house with an eligible woman was selected using systematic random sampling, until the sample size was reached.

5.9 Data collection

The participants were interviewed at their homes and blood collection was also done at common locations arranged within the village itself after overnight fasting. Anthropometric measurements were taken along with blood collection.

5.9.1 Informed consent

An information sheet (in Tamil) was given which explained the purpose of the study, voluntary nature of participation and confidentiality regarding the concerns and the disease. The information was also explained verbal by the investigator.

5.9.2 Figure 2: Flow chart of study:

```
┌─────────────────────────────────────────────────────────────────┐
│ Two villages from Kanyambadi (A and B) were chosen based on      │
│ feasibility of a dietary intervention program                    │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ No. of eligible women in A was 142 and B was 385                 │
│ 130 randomly selected eligible women from A and 130 women from   │
│ every second house in B were contacted                           │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ 130 women from A and 130 women in B were given information       │
│ sheets - One person refused to participate                       │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ Structured questionairre administered assessing diet and         │
│ associated factors                                               │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ Anthropometric measurements (height, weight and waist            │
│ circumference) and blood pressure were recorded                  │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ Fasting venous blood samples were collected for estimation of    │
│ blood glucose, lipid profile                                     │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ Data entry using epidata software and analysis using SPSS        │
└─────────────────────────────────────────────────────────────────┘
```

5.9.3 Study tools and procedures:

Questionnaire:

a. Socio-demographic characteristics of the study population

b. WHO STEPS questionnaire to collect information on intake of salt, fruits and vegetables (51)

c. Physical activity (travel to work place and recreational activities based on the WHO STEPS questionnaire)

d. Dietary consumption of salt, sugar and oil of the household

e. Individual dietary intake of the study participants by 24 hours recall method

The study questionnaire was translated into Tamil and was translated back to English to check for errors in translation.

Anthropometric measurements:

Weight was measured using electronic weighing scales. Precautions were taken to eliminate measurement errors (zero correction and use of flat surface). Height was measured using a stadiometer. Waist circumference was measured using a non-expandable tape.

Blood pressure measurement:

Blood pressure was checked using Omron automatic blood pressure monitor in sitting position. Three readings were taken, and the average was calculated as per WHO recommendation (51).

Data collection procedures:

The study participants were interviewed after obtaining informed consent. A field worker trained by the principal investigator assisted in identifying participants and in collecting demographic data. The field worker also assisted in the diet survey using the 24-hour diet recall. The participants were informed about the procedure for fasting blood sample and blood pressure estimation on the subsequent day. Anthropometric measurements and blood pressure measurements were done at the same time that 5 ml venous blood sample was collected, after overnight fasting. The blood samples were sent to the laboratory of the base hospital of the Community Health Department, Christian Medical College, to assess blood glucose level and lipids (total cholesterol, triglycerides, HDL and LDL).

5.10 Study variables:

Socio-demographic variables:

- Age
- Education of the study participation
- Occupation of the study participation
- Monthly income of the family
- Marital status

Socio-economic status measurement:

B.G. Prasad's socio-economic status updated scale was used to calculate the socio-economic status of the family (52). The monthly family income was used for this classification based on monthly per capita income and the different social class categories are as given below:

- Upper social class: More than Rs. 6260

- Upper middle class: Rs. 3099-6260

- Middle class: Rs. 1835-3098

- Lower middle class: Rs. 949-1834

- Lower class: Less than Rs. 948

Household dietary practice and dietary intake of the study participants:

Information on monthly consumption of oil, refined sugar and salt by the entire family was obtained and per capita daily intake was calculated. From the refined sugar intake, proportion of calories consumed through refined sugar was calculated.

Details on diet intake on the previous day were obtained using the 24-hour dietary recall. Using the information given by National Institute of Nutrition, Hyderabad (20), on nutrient values of common south Indian food items, the total calories, protein intake, fat and carbohydrate intake were calculated. Based on this, proportion of calories consumed through carbohydrates and fat were calculated.

Various continuous variables related to dietary practices like salt intake, proportion of calories from fat, carbohydrate and total calories were then categorized into different groups:

- Salt intake was classified as < 5 grams per day, 5 - 9 grams per day and > 9 grams per day (51)

- The proportion of calories from refined sugar intake was classified as < 5%, 5-10% and >10%.

- The proportion of calories from fat intake was classified as < 15%, 15-29% and >30%.

- The proportion of calories from carbohydrate intake was classified as < 60%, and >60%.

- The total calories intake in 24 hours was classified as <1800, 1800-2000, 2001-2000 and >2200.

- The fruits and vegetable intake was classified as $\geq$ 5 servings (400 gms) per day and less than 5 servings per day, based on the WHO recommendations.

Nutritional status of the study population:

From the measured weight and height of the study participants, Body Mass Index (BMI) was calculated and classified into different categories as per the World Health Organization's (WHO) classification (51).

BMI classification:

- Underweight: less than 18.5kg/m^2
- Normal: 18.5 to <25 kg/m^2
- Overweight: 25.0 to <30 kg/m^2
- Obese: 30.0 or higher kg/m^2

Abdominal obesity was assessed based on the waist circumference as waist circumference of 80 cm and above (53).

Diabetes:

Fasting blood sugar values were classified as below (51):

- Normal: <110 (mg/dl)

- Impaired: 110-125 (mg/dl)

- Raised: 126 (mg/dl) and above

Hypertension:

Blood pressure (BP) values were classified as below (51):

- Hypertension: Systolic BP $\geq$ 140 (mm of Hg) and/ or Diastolic BP of $\geq$ 90 (mm of Hg)

Dyslipidemia:

Based on the lipid profile of the study participants, the following categories were taken based on the recommendation of the WHO STEPS analysis guidelines (51):

- High total cholesterol: $\geq$ 190 (mg/dl)

- Low HDL: < 50 (mg/dl)

- High LDL: $\geq$ 130 (mg/dl)

- High triglycerides: $\geq$ 150 (mg/dl)

Metabolic syndrome:

Based on the triglycerides, High Density Lipoprotein (HDL), blood glucose levels, blood pressure and abdominal obesity, study participants were classified as having metabolic syndrome.

Diagnosis of metabolic syndrome was made if <u>any three</u> of the following was present (54):

- Waist circumference: $\geq$ 80 (cms)

- Triglycerides: $\geq$ 150 (mg/dl)

- HDL: < 50 (mg/dl)

- Blood pressure: SBP $\geq$ 130 or DBP $\geq$ 85 (mm of Hg)

- Fasting blood glucose: $\geq$ 100 (mg/dl)

5.11 Data entry and analysis:

Data collected was entered in Epidata 3.1 and checked for consistency and errors. Dietary intake in the last 24 hours was entered in an excel spreadsheet, along with nutrient and calories values for each food item (based on the reference values of the National Institute of Nutrition, Hyderabad) (15), to calculate the total calorie, fat, carbohydrate and protein intake. The proportion of calories obtained from the macronutrients was also calculated.

To obtain per capita daily intake of salt, oil and sugar, the monthly household consumption was divided by the number of household members.

Analysis of the data was done using SPSS version 24. Associations between categorical variables was assessed using chi-square tests and odds ratios, followed by multivariate logistic regression to adjust for confounding factors. Means were reported with standard deviation, while median values were reported when the distribution was non-normal.

6. Results

6.1 Descriptive socio demographic statistics of the study population

The socio-demographic characteristics of the 261 women who participated in the study are shown in Table 3.

Table 3 Socio-demographic characteristics of the study population (n=261)

Variables	Categories	No.	(%)
Age	30-33 years	100	38.3 %
	34-37 years	103	39.5 %
	38-40 years	58	22.2 %
Education (completed)	No formal education	36	13.8 %
	Less than 8th grade	58	22.2 %
	8th grade	66	25.3%
	10th grade	50	19.2%
	12th grade	43	16.5%
	Graduation	5	1.9%
	Post-graduation	3	1.1%
Occupation	Household work	56	21.5%
	Manual labor	107	41.0%
	Self employed	64	24.5%
	Non-government	33	12.6%

	Government	1	0.4%
Socio-economic status (BG Prasad)	Lower	132	50.6%
	Lower Middle	71	27.2%
	Middle	35	13.4%
	Upper Middle	17	6.5%
	Upper	6	2.3%
Marital status	Never married	5	1.9%
	Currently married	235	90.1%
	Separated/divorced	9	3.5%
	Widowed	12	4.6%

Almost half of the participants (47.5%) had completed eight or less years of education (Table 3). Half of the women belonged to the lower socioeconomic class according to the BG Prasad classification (Table 3). The mean age of participants was 34.71 years (SD 3.19).

The mean income per month of the family of the study participants was found to be 5517.2 (SD = 5789.8) INR and the median was 3600 INR.

6.2. Medical and family/household history of NCDs

Most participants did not have any history of NCD. Only two women had been diagnosed to have diabetes previously (Table 4). Of the 261 participants, 66 (22.9%) had family/household history of an NCD.

Table 4 Medical and family/household history of NCD (n=261)

NCD	Participant's medical history of NCD		NCD in family/household	
	No.	%	No.	%
Diabetes	2	1	40	15.3
Hypertension	0	0	22	8.4
Bronchial asthma	0	0	5	1.9
Others*	0	0	5	1.9
Any NCD	2	0.76	60	22.9

*others included hypothyroidism, epilepsy, and renal calculi

6.3. Results of the survey on dietary practices

6.3.1 Salt intake among the participants

The per capita mean salt intake per day was 14.8 gm (SD 11.6 gm), 95% CI: 13.4 gm-16.2 gm, while the per capita median salt intake per day was 12.9 gm. Only two out of the 261 women (0.8%) were taking less than the recommended 5 gram per day limit for salt intake (Table 5a).

Table 5a: Amount of salt intake per day by the study participants

Amount of daily salt	No.	%	95% CI
< 5 gms per day	2	0.8	0 -1.9
5-9 gms per day	84	32.2	26.4-38.3
> 9 gms per day	175	67.0	61.3-73.2

All the participants added salt while cooking (Table 5b) while 33.3% were consuming processed foods often or always.

Table 5b: Addition of salt to food items

Time of addition	Always	Often	Sometimes
Adding salt before eating	42 (16.1%)	47 (18%)	172 (65.9%)
Adding salt when cooking	100 (100%)	0	0
Processed food*	28 (10.7%)	59 (22.6%)	174 (66.7%)

*namkeen, dry fish, banana chips and fried chips

A large proportion thought (48.3%) that they were taking the right amounts of salt, while 43.7% thought they were taking less salt (Table 5c).

Table 5c Self reported salt intake among the participants

Self-reported intake	No.	%
Too much	21	8.0%
Right amount	126	48.3%
Less	114	43.7%
Total	261	100%

The most commonly practiced measures to control salt intake was by limiting the consumption of processed food, which was mainly dry fish and chips, Table 5d.

Table 5d Efforts to control salt intake

Efforts	No.	%
Limit consumption of processed food	162	62.1
Look at salt/sodium content on label	38	14.6
Buy low sodium salt	0	0
Use alternate spices	25	9.6
Avoid food prepared outside	80	30.7

Most of them said there was no alternative to salt (Table 5d).

6.3.2 Consumption of oil and refined sugar

The proportion of women taking more than the recommended upper limit of 50 g/day of sugar (strong recommendation limit) was 3.4% (9 women), while 19.9% (52 women) consumed more than 25 gm/day (conditional recommendation by the WHO, for which full benefits and harms are not yet clear). The per capita daily consumption of oil and sugar are shown in Table 6.

Table 6 Percapita consumption of oil and sugar intake

Food item	Daily per capita mean intake (gm), SD	95% CI (gm)	Daily per capita median intake (gm)
Oil	23.6 (11.3)	21.50-24.19	21.5
Refined sugar	19.3 (13.6)	17.41-21.44	16.12

6.3.3 Fruit and vegetable intake

The mean fruit and vegetable intake per day was 0.79 servings (one serving is 80 gm).

While fruits were consumed around twice a week, vegetables were consumed around five days a week. The distribution of intake of servings of fruits and vegetables is shown in Figure 3.

Fig 3: Daily servings of fruits and vegetables

Daily servings of fruits and vegetables

2, 1%
15, 6%
244, 93%

■ >/=5
■ 2 to 4
■ <2
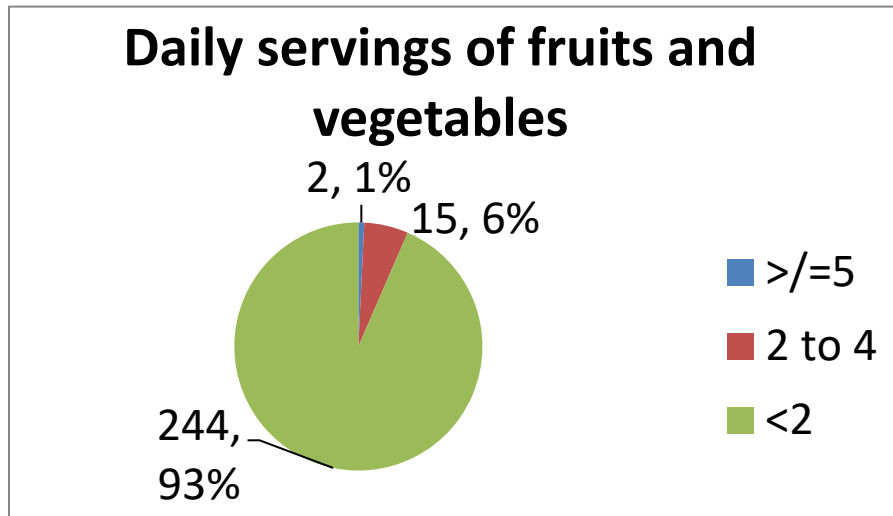
Table 7 Consumption of fruits and vegetables by the study population

	Indicator	Mean	95% CI
Fruit intake	Number of days in a week	1.96	1.75-2.18
	Number of servings on the days when consumed	1.47	1.35-1.60
	Mean servings per day	0.43	0.36-0.50
Vegetable intake	Number of days in a week	4.94	4.72-5.15
	Number of servings on the days when consumed	0.44	0.38-0.50
	Mean servings per day	0.36	0.30-0.43
Fruit and vegetable intake	Total number of servings of fruits and vegetables per day	0.79	0.69-0.89

6.3.4 Calorie and macronutrient intake

The calories consumed per day and energy derived from carbohydrates, fats and proteins are shown in Tables 6a to 6e.

The Institute of Medicine, National Academies (United States), recommends acceptable macronutrient distribution ranges (AMDR) for carbohydrates as 45 percent to 65 percent of calories. In this study, 75.5% of total calories on an average was from carbohydrates (Table 8a). For one fourth of the participants, more than 80% of total daily calories was from carbohydrates. The median calorie intake was 1833.68 kcal.

The average calories obtained from fats was 12.3%, which is well below the upper limit of 30% of total energy intake from fats as suggested by the WHO (Table 8a), with only one person whose consumption was above this limit (Table 8c).

Table 8a Dietary intake of the study population based on a 24 hour recall

Category	Mean (SD)	95% CI
Total calories (kcal)	1834.8 (406.9)	1783.4-1898.2
Protein (gms)	44.5 (11.8)	43.2-47.32
Carbohydrates (gms)	348.2 (94.4)	335.8-362.72
Fat (gms)	24.6 (11.7)	22.9-26.3
Proportion of calories from carbohydrates (%)	75.5	74.3-76.7
Proportion of calories from fats (%)	12.3	11.5-13.1

Table 8b Proportion of daily calories obtained from carbohydrates

Proportion of daily calories from carbohydrates	No.	%	95% CI
> 80 % of calories	47	25.5	19.6-31.5
61-80 % of calories	130	70.7	64.1-77.2
<60% of calories	7	3.8	1.1-7.1

Table 8c Proportion of daily calories obtained from fats

Proportion of daily calories from fats	No.	%	95% CI
< 15% of total calories	128	69.6	62.0 -76.1
15%-29.9% of total calories	55	29.9	22.8-37.5
> 30% of total calories	1	0.5	0.0-1.6

The proportion of women who were consuming less than 50% of the RDA (Recommended Daily Allowance) for protein intake (1g/kg/day) was 9.2% (95% CI:5.4-13.6%), Table 8d. Only 21.3% of the women were consuming the amount recommended.

Table 8d Protein intake according to Recommended Daily Allowance

RDA protein	No.	%	95% CI
< 50 % of RDA	17	9.2	5.4-13.6
50%-99% of RDA	167	90.8	86.4-94.6
100% or more of RDA	39	21.3%	15.3-27.3

Table 8e Total calorie intake of the participants

Calorie per day (kcal)	No.	%	95% CI
<1800	86	46.7	39.1-54.3
1800-1999	36	19.6	13.6-26.1
2000-2199	25	13.6	8.7-18.5
2200 -2499	27	14.7	9.8-20.1
≥ 2500	10	5.4	2.2-8.7

The proportion who took 2200 kcal or more per day (recommendation for vigorously active women as given by the Institute of Medicine, Washington DC) (50) was 20.1% (Table 8e).

The proportion of participants, whose dietary intake was unhealthy for various nutrients, is shown in Table 9. The WHO recommends at least 400 g (5 servings) of fruits and vegetables a day, but the consumption of fruits and vegetables among the study participants was less than 1 daily serving (Table 9). Nearly all the women (99.5%) had calorie consumption from carbohydrates of ≥ 60%.

Table 9 Proportion of the study population with unhealthy dietary intake

Nutrient group consumed per day	No.	%	95% CI
Vegetable and fruits < 5 servings (400 gms)	259	99.2	98.1-100.0
Salt ≥ 5 gms	2	1.1	0.0-1.9
Refined sugar > 50 gm	8	3.1	1.2-5.4
Fat > 30% of total calories	1	0.5	0.0-1.6
Carbohydrate ≥ 80% of total calories	47	25.5	19.6-31.5

6.3.5 Knowledge regarding diet

Knowledge related to consumption of rice

Majority of the participants (89.7%) felt that lowering the proportion of rice in the diet was important and 80.1% felt that a predominantly rice based diet causes health problems (Table 10a and 10b).

Table 10a Perception of importance of lowering the proportion of rice in the diet

Perceived importance of lowering rice	No.	%
Very important	145	55.6
Somewhat important	89	34.1
Not at all important	27	10.3
Total	261	100

Table 10b Perceptions regarding effects of a predominantly rice based diet on health

Effect of heavily rice based diet on health	No.	%
Yes, can cause health problems	209	80.1
No	52	19.9
Total	261	100

Awareness regarding role of food in preventing heart disease and cancer was very low (l6.6% and 7.7% respectively), while more than half the women said they were aware of foods which can prevent diabetes (Table 10c).

Table 10c Perceived knowledge regarding foods that protect against various NCDs

Response	Do you know any foods that protects from		
	Heart disease	Diabetes	Cancer
Yes	43 (16.6%)	156 (59.8)	20 (7.7)
No	218 (83.5%)	105 (40.2)	241 (92.3)
Total	261 (100.0%)	261 (100.0%)	261 (100.0%)

Very few women identified the protective role of fruits and vegetables in preventing NCDs (Table 10d). However, increasing millets and whole grains (ragi, whole wheat) was mentioned most commonly as useful food groups for preventing diabetes.

Table 10d Perception of food groups identified as having a relationship to prevention of NCDs

Food group and response	Proportion of women who identified the food group with prevention of NCDs	
	Heart disease	Diabetes
Fruits and vegetables	12*/261 (4.6%) *fruits	17/261 (6.5%)
Whole grains and millets	0 (0%)	138/261 (52.8%)

Decreasing consumption of oil was identified by 12.3% of women as a measure to prevent heart disease (Table 10e), while 8% mentioned that decreasing rice consumption was a method of decreasing the risk of diabetes.

Table 10e Perceptions of food groups which need to be decreased to prevent NCDs

Food group and response	Proportion of women who identified the food group with prevention of NCDs	
	Heart disease	**Diabetes**
Decreased intake of oils	32/261 (12.3%)	0 (0%)
Decreased intake of sugar (refined carbohydrates)	0 (0%)	1/261 (0.4%)
Decreased intake of rice (refined carbohydrates)	0 (0%)	21/261 (8.0%)
Decreased non-vegetarian food	11/261 (4.2%)	0 (0%)

None of the participants knew about any foods that can protect them from cancer.

6.4. Anthropometric, physical and biochemical characteristics of the study population

6.4.1 Nutritional status of the study population based on Body Mass Index

The mean height of the study participants was found to be 153.4 cm (95% CI: 152.7-154.22) and the mean weight of the study participants was 55.7 kg (95% CI: 54.4-57.2).

The mean BMI (Body Mass Index) of the study population was 23.67 kg/m^2 (95% CI: 23.08-24.26) SD 4.84 kg/m^2.

About 34.1% (89) of the women in the study were found to have a BMI of more than or equal to 25 kg/m^2 (Table 11).

Table 11 Nutritional status of the study population (based on BMI)

Nutritional status	Category kg/m^2	No.	%
Body Mass Index (BMI) in kg/m^2	Underweight (<18.5)	38	14.6
	Normal (18.5-24.9)	135	51.7
	Overweight (25.0-29.9)	60	23
	Obese ($\geq$ 30.0)	28	10.7

6.4.2 Abdominal obesity (based on waist circumference)

Among the study participants 137 (52.5 %) were found to have waist circumference of more than and equal to 80 cm, which is the marker for abdominal obesity among Asians.

6.4.3 Blood pressure measurements

Elevated blood pressure (SBP $\geq$ 140 mm of Hg and/or DBP $\geq$ 90 mm of Hg) was seen in 32 women (12.3%, 95% CI: 8.42%–16.12%), Table 12. The mean systolic blood pressure was 118 mm of Hg, SD 12.04, (95% CI: 117.1-120.2 mm of Hg), while the mean diastolic blood pressure was 77 mm of Hg, SD 9.25 mm, (95% CI: 76.1-78.2 mm of Hg).

Table 12 Prevalence of hypertension among the study population (n=261)

Definition	No. (%)	95% CI (%)
SBP ≥140 mm of Hg	19 (7.3%)	4.2-10.7
DBP ≥ 90 mm of Hg	26 (10%)	6.5-13.4
SBP ≥ 140 and/or DBP ≥ 90 mm of Hg	32 (12.3%)	83.9-91.6

6.4.4 Fasting blood glucose measurements

The mean fasting blood glucose (FBG) of the study participants was found to be 101.21 mg/dl (95% CI: 98.52-104.91 mg/dl), with **5.4% (14) having a raised fasting blood glucose of ≥ 126 mg/dl** that included the two previously diagnosed women, Table 13.

Table 13 Fasting blood glucose values of the participants (n=261)

Category	No. %	95 % CI (mg/dl)
Normal (<110 mg/dl)	222 (85.1%)	85.1 (80.5-89.3)
Impaired (110 to 125 mg/dl)	25 (9.6%)	9.6 (6.1-13.8)
Raised (≥ 126 mg/dl) *	14 (5.4%)	5.4 (2.7-8.0)

*The two women with previously diagnosed diabetes had raised FBG

6.4.5 Profile of lipid measurements

The lipid profile of the participants is shown in Table 14.

Table 14 Lipid profile values of the participants (n=261)

Lipid type	Categories (mg/dl)	No. (%)	95 % CI (%)	Mean (mg/dl), 95% CI (mg/dl)
Total cholesterol	≥190	37 (14.2%)	10.3-19.2	157.33 (153.6 – 161.01)
	< 190	224 (85.8%)	80.8-89.7	
HDL	<50	122 (46.7%)	40.6-52.5	51.78 (50.23 – 53.28)
	>50	139 (53.3%)	47.5-59.4	
LDL	<129	235 (90%)	86.6 – 93.5	91.22 (88.13-94.47)
	>130	26 (10%)	6.5 – 13.4	
Triglycerides	≥150	44 (16.9%)	12.3-21.8	106.03 (98.93 – 113.01)
	<150	217 (83.1%)	78.2-87.7	

Among the study participants, 46.7% (122) of women had **HDL** of less than 50 and 16.9% (44) had elevated **triglycerides** of more than 150 mg/dl. **Total cholesterol** of more than or equal to 190 mg/dl was found in 14.2% (37) of women who participated in the study, Table 14.

6.4.6 Metabolic syndrome

Among the 261 women who participated in the study, 30.7% (80) had metabolic syndrome, defined according to the joint definition of the International Diabetes Federation (IDF), as any three of the risk factors shown in Table 15.

Table 15 Prevalence of metabolic syndrome among the study participants

Indicators	No.	%	95% CI
Waist circumference ≥ 80 cm	134	51.3%	45.2-57.1
Triglyceride ≥ 150 mg/dl	44	16.9%	12.3-21.8
HDL < 40 mg/dl	122	46.7%	40.6-53.2
Blood pressure SBP ≥ 130 or DBP ≥ 85 mm of Hg	60	23%	18.0-28.4
Fasting blood glucose ≥ 100 md/dl	95	36.4%	30.7-42.1
Metabolic syndrome (presence of any 3 of the above risk factors)	80	30.7%	63.6-74.7

6.4.7 Physical activity

Among the 261 participants 248 (95%) reported that they walk or bicycle every day, with a mean of 6.8 days per week (SD 0.68). However only 10 women (3.8%) reported doing any leisure time physical activity such as brisk walking. As many women were unable to estimate accurately the amount of time spent in doing walking per day, this data was not analyzed as it would be erroneous.

6.5. Factors associated with unhealthy dietary practices

Socio demographic factors as well as other dietary practices were analysed as factors associated with unhealthy diet.

6.5.1 Socio-demographic factors associated with unhealthy dietary practices

Sociodemographic factors associated with high salt intake are shown in Table 16.

Table 16: High per capita salt intake and associated socio demographic factors

Variables	Category	Per capita daily salt intake ≥ 9 gm		Per capita daily salt intake < 9 gm	
		No.	%	No.	%
Age (years)	30-35	98	63.2	57	36.8
	36-40	77	72.6	29	27.4
Education	No formal education	23	63.9	13	36.1
	Less than 8th grade)	49	73.1	18	26.9
	Completed 8th grade	54	72.0	21	28.0
	Completed 10th grade	34	61.8	21	38.2
	Higher secondary school (12th grade)	11	52.4	10	47.6
	Graduation	3	50.0	3	50.0
	Post-graduation	1	100	0	0
Occupation	Household work	28	50.9	27	49.1
	Manual labour	63	66.3	32	33.7
	Others	21	61.8	13	38.2
Socio-Economic Status (BG Prasad)	Upper	6	100	0	0
	Upper middle	13	76.5	4	23.5
	Middle	19	54.3	16	45.7
	Lower Middle	46	64.8	25	35.2
	Lower	91	68.9	41	31.1
Marital status	Never married	3	60	2	40
	Currently married	156	66.4	79	33.6
	Separated/ divorced	16	76.2	5	23.8
Family/ household member with NCD	Yes	40	66.7	20	33.3
	No	135	67.2	66	32.8

High salt intake was classified as ≥ 9 gm per capita per day as almost all the participants were taking above the WHO recommended limit of 5 gm/day, which therefore could not be used to classify salt intake. The current average salt intake per capita is estimated to be 9-12 gm/day

(WHO). Salt intake was higher among those with lower education and those engaged in manual labor (Table 16).

Table 17 High carbohydrate intake and associated socio demographic factors

Variables	Category	Calories from carbohydrates ≥ 80%		Calories from carbohydrate < 80%	
		No.	%	No.	%
Age (years)	30-35	33	31.7	71	68.3
	36-40	22	27.5	58	72.5
Education	No formal education	8	27.6	21	72.4
	Less than 8th grade)	17	39.5	26	60.5
	Completed 8th grade	14	25.5	41	74.5
	Completed 10th grade	10	27.8	26	72.2
	Higher secondary school (12th grade)	5	33.3	10	66.7
	Graduation	1	20	4	80
	Post-graduation	0	0	1	100
Occupation	Household work	13	23.6	42	76.4
	Manual labor	27	28.4	68	71.6
	Others	15	44.1	19	55.9
Socio-Economic Status (BG Prasad)	Upper	2	50	2	50
	Upper middle	3	21.4	11	78.6
	Middle	6	23.1	20	76.9
	Lower Middle	16	34.8	30	65.2
	Lower	28	29.8	66	70.2
Marital status	Never married	0	0	4	100
	Currently married	51	30.7	115	69.3
	Separated/ divorced	4	28.6	10	71.4
Family/house hold member with NCD	Yes	10	23.8	32	76.2
	No	45	31.7	97	68.3

High carbohydrate intake was defined based on proportion of calories from carbohydrates (Table 17) as those who had 80% or more of calories from carbohydrates and those with less than 80%.

Table 18 High calorie intake and associated sociodemographic factors

Variables	Category	Calorie intake > 2200 kcal		Calorie intake ≤ 2200 kcal	
		No.	%	No.	%
Age (years)	30-35	21	20.2	83	79.8
	36-40	16	20.0	64	80.0
Education	No formal education	4	13.8	25	86.2
	Less than 8th grade)	12	27.9	31	72.1
	Completed 8th grade	10	18.2	45	81.8
	Completed 10th grade	5	13.9	31	86.1
	Higher secondary school (12th grade)	5	33.3	10	66.7
	Graduation	1	20.0	4	80
	Post-graduation	0	0	1	100
Occupation	Household work	13	23.6	42	76.4
	Manual labor	18	18.9	77	81.1
	Others	6	17.6	28	82.4
Socio-Economic Status (BG Prasad)	Upper	0	0.0	4	100.0
	Upper middle	4	28.6	10	71.4
	Middle	5	19.2	21	80.8
	Lower Middle	13	28.3	33	71.7
	Lower	15	16.0	79	84.0
Marital status	Never married	0	0.0	4	100.0
	Currently married	34	20.5	132	79.5
	Separated/ divorced	3	21.4	11	78.6
Family/ household member with NCD	Yes	7	16.7	35	83.3
	No	30	21.1	112	78.9

Those with a family or household member with NCD were less likely to have calorie intake > 2200 kcal, but this was not statistically significant (Table 18).

6.5.2 Association between sociodemographic factors and other dietary practices on diet: odds ratios

Association between various unhealthy dietary practices was also studied (Tables 19-21), to assess if those with one unhealthy practice were also likely to have another unhealthy dietary practice.

Table 19a Association (bivariate) between high salt intake, demographic and dietary factors

Variables	Categories	≥ 9 gm per capita daily salt intake		<9 gm per capita daily salt intake		P-value	Odds ratio
		No.	%	No.	%	0.11	1.54 (0.90-2.64
Age (years)	30-35	98	63.2%	57	36.8		
	36-40	77	72.6%	29	27.4		
Education	Up to 10th grade	160	68.7	73	31.3	0.11	1.90 (0.86-4.19)
	> 10th grade	15	53.6	13	46.4		
Occupation	Gainfully employed	134	71.3	54	28.7	**0.02**	1.94 (1.11-3.39)
	Household work	41	56.2	32	43.8		
Socio-Economic Status (BG Prasad)	Lower & middle	156	65.5	82	34.5	0.08	2.49 (0.82-7.58)
	Upper	19	82.6	4	17.4		
Marital Status	Currently married	156	66.4	79	33.6	0.49	0.73 (0.29-1.80)
	Others	19	73.1	7	26.9		
Daily calorie intake	> 2200 kcal	22	59.5	15	40.5	0.84	0.92 (0.44-1.93)
	≤ 2200 kcal	90	61.2	57	38.8		
% of calories from carbohydrates	≥ 80%	34	63.6	20	36.4	0.61	1.18 (0.61-2.26)
	< 80%	77	59.6	52	40.3		
Per capita daily refined sugar	≥ 25 gms/day	42	80.8	10	19.2	**0.01**	2.40 (1.13-5.05)
	< 25 gms/day	133	63.6	76	36.4		
	≥ 50 gms/day	8	88.9	1	11.1	0.27	4.07 (0.50-3.09)
	< 50 gms/day	167	66.3	85	33.7		
Family/household member with NCD	Yes	40	66.7	20	33.3	0.943	0.98 (0.53-1.80)
	No	135	67.2	66	32.8		
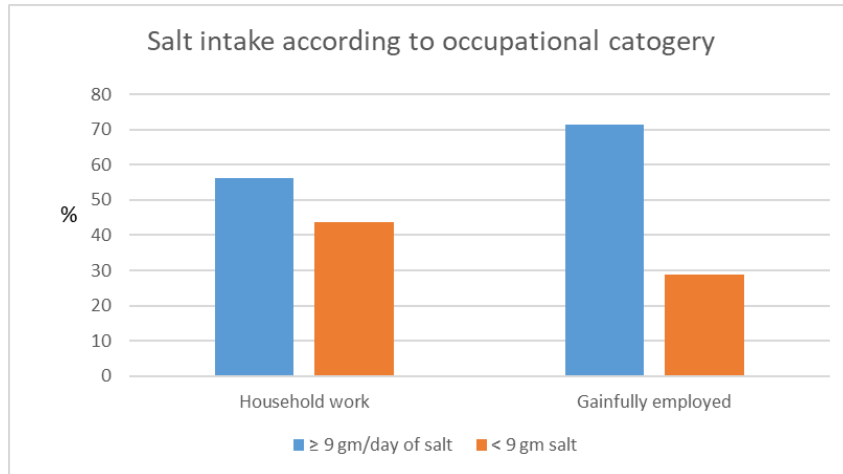
Figure 4: Association between salt intake and occupation.

As shown in Figure 4, women who were gainfully employed outside the home had higher salt intake.

Table 19b Adjusted odds ratios between high salt intake, demographic and dietary factors

Risk factor	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value
Higher age (36-40 years)	1.54 (0.90-2.64)	0.41 (0.86-2.62)	0.144
Upper social class	2.49 (0.82-7.58)	0.95 (0.80-8.29)	0.110
Occupation (gainfully employed outside the home)	1.94 (1.11-3.39)	2.06 (1.15-3.69)	0.015
Higher per capita sugar intake ($\geq$ 25 gm/day)	2.40 (1.13-5.05)	0.74 (0.98-4.51)	0.057

After adjusting for age, social class and sugar intake, working outside the home was associated with higher salt consumption (Table 19 b). Those with higher sugar intake also showed a trend to take higher salt as well (p=0.057).

Higher carbohydrate intake was associated with working outside the home, although the association was not statistically significant. Those with higher total calorie intake had a higher proportion of calorie intake from carbohydrates (Table 20a).

Table 20a Association (bivariate) between carbohydrate intake, demographic and dietary factors

Variables	Categories	Calories from carbohydrate ≥ 80%		Calories from carbohydrates < 80%		P value	Odds ratio
		No.	%	No.	%		
Age (years)	30-35	33	31.7	71	68.3	0.53	0.81 (0.43-1.55)
	36-40	22	27.5	58	72.5		
Education	Up to 10th grade	49	30.1	114	69.9	0.88	1.07 (0.39-2.96)
	> 10th grade	6	28.6	15	71.4		
Occupation	Gainfully employed	42	32.6	87	67.4	0.23	1.56 (0.75-3.21)
	Household work	13	23.6	42	76.4		
Socio-Economic Status	Upper	5	27.8	13	72.2	0.83	0.74 (0.30-2.63)
	Lower & middle	50	30.1	116	69.9		
Marital status	Currently married	51	30.7	115	69.3	0.59	1.55 (0.48-4.94)
	Others	4	22.2	14	77.8		
Daily calorie intake	> 2200 kcal	17	45.9	20	54.1	**0.02**	2.43 (1.15-5.13)
	≤ 2200 kcal	38	25.9	109	74.1		
Per capita daily salt intake	≥ 9 gms	35	31.3	77	68.8	0.61	1.18 (0.61-2.26)
	< 9 gms	20	27.8	52	72.2		
Per capita daily refined sugar	≥ 25 gms/day	9	27.3	24	72.7	0.71	0.85 (0.36-1.98)
	< 25 gms/day	46	30.5	105	69.5		
Recognized importance of lowering rice	Yes	6	46.2	7	53.8	0.20	2.13 (0.68-6.67)
	No	49	28.7	122	71.3		
Family/ household member with NCD	Yes	10	23.8	32	76.2	0.327	0.67 (0.31-1.49)
	No	45	31.7	97	68.3		

Table 20b Adjusted odds ratios between high carbohydrate intake, demographic and dietary factors.

Risk factor	Unadjusted odds ratio	Adjusted odds ratio	P value
Higher age (36-40 years)	0.81 (0.43-1.55)	0.80 (0.42-1.55)	0.515
Occupation (gainfully employed outside the home)	1.56 (0.75-3.21)	1.68 (0.80-3.52)	0.170
Daily calorie intake > 2200 kcal	2.43 (1.15-5.13)	2.55 (1.19-5.43)	0.015

After adjusting for age and occupation, higher daily calorie intake was associated with higher proportion of calories from carbohydrates (Table 20b), as those who had higher carbohydrates in their diet had higher calorie intake. This is also seen in the Table 21a, where those who had ≥ 80% of daily calories derived from carbohydrates were 2.4 times more likely to be consuming total calories of > 2200 kcal/day.

Although there was a trend observed for those with a family/household member with NCD to have lower total calorie consumption (Table 21a), this was not a significant association, probably because very few women had such a family/household member.

Table 21a: Association (bivariate) between high calorie intake, demographic and dietary factors

Variables	Categories	Daily calorie intake > 2200 kcal		(55)Daily calorie intake ≤ 2200 kcal		P value	Odds ratio
		No.	%	No.	%		
Age (years)	30-35	21	20.2	83	79.8	0.97	0.98 (0.47-2.04)
	36-40	16	20.0	64	80.0		
Education	Up to 10th grade	31	19.0	132	81.0	0.30	0.58 (0.21-1.63)
	> 10th grade	6	28.6	15	71.4		
Occupation	Gainfully employed	24	18.6	105	81.4	0.44	0.74 (0.34-1.59)
	Household work	13	23.6	42	76.4		
Socio-Economic Status	Upper	4	22.2	14	77.8	0.76	1.15 (0.35-3.72)
	Lower & middle	33	19.9	133	80.1		
Marital status	Currently married	34	20.5	132	79.5	0.70	1.28 (0.35-4.70)
	Others	3	16.7	15	83.3		
Per capita daily salt intake	≥ 9 gms	22	19.6	90	80.4	0.84	0.93 (0.44-1.93)
	< 9 gms	15	20.8	57	79.2		
% of calories from carbohydrates	≥ 80%	17	30.9	38	69.1	**0.017**	2.43 (1.15-5.13)
	< 80%	220	15.5	109	84.5		
Per capita daily refined sugar	≥ 50 gms/day	3	50.0	3	50.0	0.97	4.23 (0.82-21.9)
	< 50 gms/day	34	19.1	144	80.9		
Per capita daily refined sugar	≥ 25 gms/day	7	21.2	26	78.8	0.86	1.09 (0.43-2.74)
	< 25 gms/day	30	19.9	121	80.1		
Recognized importance of lowering rice	Yes	3	23.1	10	76.9	0.72	1.20 (0.31-4.63)
	No	34	19.9	137	80.1		
Family/ household member with NCD	Yes	7	16.7	35	83.3	0.526	0.75 (0.30-1.85)
	No	30	21.1	112	78.9		

After adjusting for age and education, the participants who had consumed more than 2200 calories were obtaining more than or equal to 80 percentage of calories from carbohydrates (p value 0.018), (Table 21b).

Table 21b Adjusted odds ratios between calorie intake (> 2200 kcal), demographic and dietary factors

Risk factor	Unadjusted odds ratio	Adjusted odds ratio	P value
Higher age (36-40 years)	0.98 (0.47-2.04)	0.12 (0.52-2.42)	0.757
Education above 10th grade	0.58 (0.21-1.63)	0.60 (0.62-5.37)	0.270
Proportion of calories from carbohydrates ≥ 80%	2.43 (1.15-5.13)	2.48 (1.17-5.24)	0.018

The associations between dietary practices and outcomes such as overweight/obesity, abdominal obesity and high blood pressure as well as biochemical outcomes are shown in Tables 20-25. No significant associations were found between dietary practices and the presence of hypertension, obesity, impaired fasting glucose ($\geq$ 126 mg/dl), high total cholesterol and metabolic syndrome.

Table 22 Association between high salt intake with hypertension and metabolic syndrome

Per capita daily salt intake	Hypertension	No hypertension	Metabolic syndrome	No metabolic syndrome
≥ 9 gm	22 (12.6%)	153 (87.4%)	55 (31.4%)	120 (68.6%)
< 9 gm	11 (12.8%)	75 (87.2%)	25 (29.1%)	61 (70.9%)
OR (95%CI)	0.98 (0.45 – 2.13)		1.12 (0.64-1.97)	
p value	0.960		0.698	

Table 23 Association between carbohydrate intake and anthropometric and physical outcomes

% of calories from carbohydrates	BMI ≥ 25 kg/m²	BMI < 25 kg/m²	Abdominal obesity	No abdominal obesity	Hypertension	No hypertension
≥ 80%	16 (29.1%)	39 (70.9%)	27 (49.1%)	28 (50.9%)	6 (10.9%)	49 (89.1%)
< 80%	44 (34.1%)	85 (65.9%)	70 (54.3%)	59 (45.7%)	17 (13.2%)	112 (86.8%)
OR (95%CI)	0.79 (0.39-1.57)		0.81 (0.43-1.53)		0.81 (0.30-2.17)	
p value	0.506		0.520		0.670	

Table 24 Association between carbohydrate intake and other cardiometabolic outcomes

% of calories from carbohydrates	Fasting blood glucose		Total cholesterol		Metabolic syndrome	
	FBG ≥ 110 mg/dl	FBG < 110 mg/dl	≥ 190 mg/dl	< 190 mg/dl	Present	Absent
≥ 80%	8 (14.5%)	47 (85.5%)	29 (52.7%)	26 (47.3%)	12 (21.8%)	43 (78.2%)
< 80%	20 (15.5%)	109 (84.5%)	69 (53.5%)	60 (46.5%)	42 (32.6%)	87 (67.4%)
OR (95%CI)	0.93 (0.38 – 2.26)		0.97 (0.52-1.83)		0.58 (0.28-1.21)	
p value	0.868		0.925		0.143	

Table 25 Association between daily calorie intake, anthropometric and physical outcomes

Daily calorie intake (kcal)	BMI ≥ 25 kg/m²	BMI < 25 kg/m²	Abdominal obesity	No abdominal obesity	Hypertension	No hypertension
> 2200	15 (40.5%)	22 (59.5%)	19 (51.4%)	18 (48.6%)	6 (16.2%)	31 (83.8%)
≤ 2200	61 (27.2%)	163 (72.8%)	105 (46.9%)	119 (53.1%)	27 (12.1%)	197 (87.9%)
OR (95%CI)	1.82 (0.89-3.74)		1.19 (0.59-2.40)		1.41 (0.54-3.69)	
p value	0.099		0.613		0.480	

Table 26 Association between daily calorie intake and other cardiometabolic outcomes

Daily calorie intake (kcal)	Fasting blood glucose		Total cholesterol		Metabolic syndrome	
	FBG ≥ 110 mg/dl	FBG < 110 mg/dl	≥ 190 mg/dl	< 190 mg/dl	Present	Absent
> 2200	9 (24.3%)	28 (75.7%)	20 (54.1%)	17 (45.9%)	16 (43.2%)	21 (56.8%)
≤ 2200	30 (13.4%)	194 (86.6%)	129 (57.6%)	95 (42.4%)	64 (28.6%)	160 (71.4%)
OR (95%CI)	2.08 (0.89-4.83)		0.86 (0.43-1.74)		0.58 (0.28-1.21)	
p value	0.084		0.687		0.143	

Those with higher calorie intake had higher fasting blood glucose, although the association was not statistically significant (Table 26).

7. Discussion

This cross-sectional survey on dietary practices and associated factors among rural women in Kaniyambadi, Vellore, Tamil Nadu was conducted using the WHO-STEPS methodology and a 24-hour diet recall. The study is a baseline assessment for a dietary health education program being planned in the department by the Community Health Department.

More than half of the women in this cross-sectional survey had education below 8th standard and 41% were manual laborers, indicating that a large proportion of this rural sample was from a lower socioeconomic status, as was confirmed by the BG Prasad classification for socioeconomic status. The sample consisted mainly of currently married women (91%). The sample of women studied represent women aged 30 to 40 years from the two study villages in the block.

The major findings from the study were the low consumption of fruits and vegetables, high per capita salt intake and high proportion of energy derived from carbohydrates, as well as poor knowledge regarding healthy diet.

Fruits and vegetable consumption

The WHO recommends at least 400 g (5 servings) of fruits and vegetables a day for a healthy lifestyle, especially for the prevention of non-communicable diseases (16). The study found low intake of fruits and vegetable (less than five daily servings) among 99% of the study participants, which was similar to other studies from Tamil Nadu: the CURES 147 study (44) and the previous study from urban and rural Vellore (20), which also showed that 99% of the population did not meet the recommendations. The IDSP (Integrated Disease Surveillance

Project) in 2007-08 (8) also showed that the percentage of respondents consumed less than five servings of fruits and vegetables per day ranged from a low 76% in Maharashtra to a high of 99% in Tamil Nadu. The average number of days in a week on which fruits were consumed was around two, while vegetables were consumed on around five days. The mean number of total servings per day of fruits and vegetables combined was less than one, compared to the recommended five, which was also seen in the previous study carried out in rural Kaniyambadi in 2010-12 (20).

Less than 10% of the women in the study identified fruits and vegetables to be important foods for prevention of heart disease and diabetes and this poor knowledge may be one of the reasons for the poor intake.

Salt consumption

The current maximum upper limit recommended by the WHO for salt consumption is 5 gm/day (16). Only 0.8% (two) of the participants had a salt consumption below this upper limit. The median salt intake of 12.9 gm per day in this study, although only a crude estimate of salt consumption, confirms the high consumption of salt in India, similar to the WHO's estimate of average salt intake per capita of 9-12 gm/day globally. This was also similar to a study carried out in Delhi, Haryana and Andhra Pradesh (22) which estimated daily salt intake as 9.45 g based on 24-hour urine samples. Although estimation of salt intake is ideally supposed to be estimated through urinary sodium excretion according to WHO STEPS (46), this was not practical or economically feasible. Therefore, a method similar to that followed by the National Sample Survey Organization (NSSO) of estimating per capita monthly expenditure was used, for oil, salt and sugar consumption .

Although almost all the participants were consuming more than the recommended intake of salt, a large proportion thought (48.3%) that they were taking the right amounts of salt, while 43.7% even thought they were taking less salt. This shows that most people are not aware of what the right amount of salt consumption actually should be. All the participants were adding salt when cooking, and this is not surprising as salt is an essential component of Indian cooking, which also does not rely on processed foods with pre-added salt. Women who were working outside the home (gainful employment) had higher salt consumption as compared to those who were homemakers. The reason for this was not explored and is a topic for further study.

On questioning the women whether they use any alternative spices to decrease salt usage, most of them said there was no alternative to salt which can never be replaced. Of those who mentioned alternative spices, sunflower seeds, tulsi extracts and cinnamon were mentioned.

Carbohydrate consumption and calorie intake

In this study, 75.5% of total calories on an average was from carbohydrates, which was similar to the results of the CURES 147 study in Kancheepuram district, among adults aged ≥ 20 years (16). This was higher than the average for the whole country (57.4%) for rural populations) as per the NSSO) (55). Majority of the participants (89.7%) however, felt that lowering rice in the diet was important and 80.1% felt that a predominantly rice based diet causes health problems. This could mean that there is some awareness now among the rural population of the need to change from a diet that is almost only rice based with less consumption of millets and whole grains. However, the current consumption pattern still reflects an unhealthy choice of high consumption of refined cereals, with a lack of diversity of cereal intake.

The median calorie intake among women aged 30-40 years in this rural area was 1833.68 kcal, which was lower than the median intake for all adults ≥ 20 years in the CURES 147 study (2034 kcals) (22). Those with higher proportion of carbohydrates in their diets were found to also have a higher calorie consumption.

Assessment of knowledge regarding rice consumption revealed that in this study, most of the women recognized the need to decrease rice consumption, while half of them mentioned that increasing millets and whole grains in the diet could help prevent diabetes. This indicates that the many but not all women had knowledge regarding need for diversification of cereal intake and decreasing intake of refined carbohydrates.

Consumption of refined sugar

Only 3.4% women in the study consumed more than the upper limit of 50 g/day of sugar (WHO recommendation for maximum daily consumption corresponding to 10% of total calories from sugar), while 19.9% consumed sugar more than 25 gm/day (WHO recommendation for maximum daily consumption corresponding to 5% of total calories from sugar). This indicates that excess sugar consumption is not a common risk factor in this rural population. However, the estimate from this study was only a crude estimate based on monthly household consumption of refined sugar and does not include sugar from other sources (processed foods, food eaten outside the home etc.), and therefore may be an underestimate.

Also the monthly household consumption was divided by all the household members, it represents average per capita intake for the houshold of the participant and may or may not reflect the consumption of the participant herself.

Anthropometric, physical and biochemical risk factors

In this study 12.3% of the study participants had hypertension, which had not been previously diagnosed. These women were referred for further confirmation and treatment to the secondary hospital run by the department. One in three of these young rural women (34.1%) of the women in the study were found to have a BMI of more than or equal to 25 kg/m^2, indicating the need for prevention of obesity in this group. This was higher than the prevalence of overweight in NFHS-4 for both India (15%) and the whole of rural Tami Nadu (25.4%) (9).

Impaired fasting blood glucose

Among the study participants 15% had impaired or raised fasting blood glucose ($\geq$ 126 mg/dl), as compared to 7.1% in the whole rural block for all those aged 30-64 years in the study in 2010-12 (20).

Dyslipidemia and the metabolic syndrome

While 46.7% of women had HDL of less than 50 mg/dl, 16.9% had elevated triglycerides of more than 150 mg/dl and 14.2% had total cholesterol of more than or equal to 190 mg/dl. In 2010-12, in the previous cross-sectional study in Kaniyambadi the percentage of women aged 30-40 years with low HDL was 81.9%, percent with high triglycerides was 15.3% and percentage with high cholesterol was 24.2%. These differences are probably due to the differences in sampling as this study was done in only two villages, while the previous study was done in a larger population (3799) from nine villages. Metabolic syndrome was present in almost one-third (30.7%) of the women (presence of any three of the risk factors mentioned in the IDF criteria) (54).

The prevalence of NCDs obtained in this study (e.g. hypertension, metabolic syndrome) does not represent the whole block and is meant only to serve as indicators for evaluation of dietary intervention programs to be planned in this area using information regarding dietary practices obtained.

8. Summary and conclusions

Inadequate consumption of fruits and vegetables was almost universal among the women aged 30-40 years old in the two study villages. The study found a low average intake of less than five daily servings of fruits and vegetable among 99% of the study participants. The mean fruit and vegetable intake per day was 0.79 servings. High salt consumption was another major dietary problem as the median per capita intake was 12.9 gms per person per household. All the participants were adding salt when cooking. None of the women were aware of any alternate means for enhancing taste other than using salt. The other major problem with the diet was the high proportion of carbohydrates in the diet. On an average 75.5% of total calories was from carbohydrates. In addition, one third of the women have metabolic syndrome, one third were overweight or obese and more than half of them had abdominal obesity, with very few having any leisure time activity. This implies that this group of young women aged 30-40 years are at high risk of developing NCDs, with cardiovascular risk factors of improper diet, overweight, abdominal obesity and the metabolic syndrome.

The information on dietary practices and knowledge from this study will be useful in planning of health education and primordial prevention targeting the rural women. Educating women regarding benefits of low salt intake and consequences of high salt intake will help them influence families and enable them to train their children from early age with good dietary habits. By educating women and thereby reaching communities it is possible to try to bring about a community-wide change in diet, thereby decrease the rising trend of NCDs in rural India.

8. Recommendations

There is a need for a dietary intervention program targeting young rural women and ther families. Rural women in the age group of 30-40 years are at risk for NCDs due to risk factors such as poor knowledge and practices with respect to diet, in addition to being overweight.

- Health education regarding various food groups and knowledge regarding balanced diets and the relationship to prevention of NCDs needs to be planned.

- Health education in the form plays, pamphlets and posters etc. can be planned for the whole family, including educating young children.

- Families of those with NCDs can be targeted for health education on diet.

- Storage of other cereal varieties such as millets (e.g., saamai) in the government's Public Distribution System will be helpful in increasing availability.

- Messages must include the recommendations on salt intake, fruit and vegetable intake, sugar intake and increasing diversity of cereals.

- Increasing availability of fruits and vegetables through alternative means of agriculture in draught prone areas (house gardens) must be encouraged.

10. Limitations

- The WHO STEPS methodology recommends use of urinary sodium to analyze salt consumption, which would have been a better indicator than per capita intake based on monthly household consumption, which is only a crude estimate. It is possible that the actual intake was higher as the participants may have also taken food from outside their homes, with salt, oil and/or sugar. In addition, guests/non-household members may also have consumed the food prepared in a household.

- The 24-hour recall was done only on one day and may not represent the usual diet of the participants.

- Only two villages were included in the study and the sample size was small

- Random selection of villages was not done as selection of villages was based on feasibility and ready availability of volunteers for the dietary intervention program planned in the selected villages.

- Per capita consumption of sugar was calculated based only on refined sugar consumption and does not include all the free sugar consumed, which includes both visible and invisible sugar. Thus, this could be an underestimate; however, it is not a major limitation as the 24-hour recall showed that consumption of other sweets and sauces was low.

- Per capita oil consumption was also only based on monthly household expenditure and therefore is only a crude estimate, as for salt and sugar.

- Amount of fats consumed was not calculated separately as saturated and unsaturated fats; similarly, protein intake was not separately calculated as animal and vegetable protein intake.

11. References:

1.   Popkin BM. The nutrition transition in low-income countries: an emerging crisis. Nutr Rev. 1994 Sep;52(9):285–98.

2.   Popkin BM, Horton S, Kim S, Mahal A, Shuigao J. Trends in diet, nutritional status, and diet-related noncommunicable diseases in China and India: the economic costs of the nutrition transition. Nutr Rev. 2001 Dec;59(12):379–90.

3.   Popkin BM. The shift in stages of the nutrition transition in the developing world differs from past experiences! Public Health Nutr. 2002 Feb;5(1A):205–14.

4.   National Family Health Survey [Internet]. [cited 2017 Oct 27]. Available from: http://rchiips.org/NFHS/factsheet_NFHS-4.shtml

5.   Prakash J. Nutritional status and dietary pattern of Indian rural women with reference to energy intake and expenditure. J Community Nutr Health. 2013 Jan 1;2:1–8.

6.   Ally H, Kinabo J, Lambert C, Biesalski H, Yildiz F. Determinants of household dietary practices in rural Tanzania: Implications for nutrition interventions. Cogent Food Agric. 2016 Aug 24;

7.   population - Mortality | biology and anthropology [Internet]. Encyclopedia Britannica. [cited 2017 Oct 27]. Available from: https://www.britannica.com/science/population-biology-and-anthropology/Mortality

8.   Oommen AM, Abraham VJ, George K, Jose VJ. Rising trend of cardiovascular risk factors between 1991-1994 and 2010-2012: A repeat cross sectional survey in urban and rural Vellore. Indian Heart J. 2016 Jun;68(3):263–9.

9.   GBD_report_2004update_full.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf

10.   Boutayeb A, Boutayeb S. The burden of non communicable diseases in developing countries. Int J Equity Health. 2005 Jan 14;4:2.

11.   Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet Lond Engl. 2006 May 27;367(9524):1747–57.

12.   Shibuya K, Mathers CD, Boschi-Pinto C, Lopez AD, Murray CJ. Global and regional estimates of cancer mortality and incidence by site: II. results for the global burden of disease 2000. BMC Cancer. 2002 Dec 26;2:37.

13.   Denny L. The prevention of cervical cancer in developing countries. BJOG Int J Obstet Gynaecol. 2005 Sep;112(9):1204–12.

14. Paul K, Singh J. Emerging trends and patterns of self-reported morbidity in India: Evidence from three rounds of national sample survey. J Health Popul Nutr. 2017 Aug 9;36(1):32.

15. Tamil Nadu.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://www.icmr.nic.in/final/IDSP-NCD%20Reports/Tamil%20Nadu.pdf

16. Aijaz R. Preventing hunger and malnutrition in India [Internet]. ORF. [cited 2017 Oct 27]. Available from: http://www.orfonline.org/research/preventing-hunger-and-malnutrition-in-india/

17. 24 Brief on Central Bureau of Health Intelligence (CBHI) Dte GHS MOHFW, Govt of Indai.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://cbhidghs.nic.in/writereaddata/mainlinkFile/24%20Brief%20on%20Central%20Burea u%20of%20Health%20Intelligence%20(CBHI)%20Dte%20GHS%20MOHFW,%20Govt% 20of%20Indai.pdf

18. Drewnowski A, Popkin BM. The nutrition transition: new trends in the global diet. Nutr Rev. 1997 Feb;55(2):31–43.

19. WHO_TRS_916.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://apps.who.int/iris/bitstream/10665/42665/1/WHO_TRS_916.pdf

20. India [Internet]. Food and Agriculture Organization of the United Nations. [cited 2017 Oct 27]. Available from: http://www.fao.org/nutrition/education/food-dietary-guidelines/regions/india/en/

21. dietaryguidelinesforninwebsite.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://ninindia.org/dietaryguidelinesforninwebsite.pdf

22. WHO | The world health report 2002 - Reducing Risks, Promoting Healthy Life [Internet]. WHO. [cited 2017 Oct 27]. Available from: http://www.who.int/whr/2002/en/

23. Popkin BM, Horton S, Kim S, Mahal A, Shuigao J. Trends in diet, nutritional status, and diet-related noncommunicable diseases in China and India: the economic costs of the nutrition transition. Nutr Rev. 2001 Dec;59(12):379–90.

24. WHO | Diet, nutrition and the prevention of chronic diseases [Internet]. WHO. [cited 2017 Oct 27]. Available from: http://www.who.int/dietphysicalactivity/publications/trs916/en/

25. The shift in stages of the nutrition transition in the developing world differs from past experiences! - PubMed - NCBI [Internet]. [cited 2017 Oct 27]. Available from: https://www.ncbi.nlm.nih.gov/pubmed/12027286

26. EAS | Dietary Fats - Index [Internet]. [cited 2017 Oct 27]. Available from: http://www.dietattheheart.com/dietary_fats/references

27. Mean Dietary Salt Intake in Urban and Rural Areas in India: A Population Survey of 1395 Persons | Journal of the American Heart Association [Internet]. [cited 2017 Oct 27]. Available from: http://jaha.ahajournals.org/content/6/1/e004547

28. dietaryguidelinesforninwebsite.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://ninindia.org/dietaryguidelinesforninwebsite.pdf

29. Barker DJ, Hales CN, Fall CH, Osmond C, Phipps K, Clark PM. Type 2 (non-insulin-dependent) diabetes mellitus, hypertension and hyperlipidaemia (syndrome X): relation to reduced fetal growth. Diabetologia. 1993 Jan;36(1):62–7.

30. Mann JI. Diet and risk of coronary heart disease and type 2 diabetes. Lancet Lond Engl. 2002 Sep 7;360(9335):783–9.

31. Elisaf M. The treatment of coronary heart disease: an update. Part 1: An overview of the risk factors for cardiovascular disease. Curr Med Res Opin. 2001;17(1):18–26.

32. Kannel WB. Blood pressure as a cardiovascular risk factor: prevention and treatment. JAMA. 1996 May 22;275(20):1571–6.

33. MacMahon S, Peto R, Cutler J, Collins R, Sorlie P, Neaton J, et al. Blood pressure, stroke, and coronary heart disease. Part 1, Prolonged differences in blood pressure: prospective observational studies corrected for the regression dilution bias. Lancet Lond Engl. 1990 Mar 31;335(8692):765–74.

34. Hooper L, Summerbell CD, Higgins JP, Thompson RL, Clements G, Capps N, et al. Reduced or modified dietary fat for preventing cardiovascular disease. Cochrane Database Syst Rev. 2001;(3):CD002137.

35. Hu FB, Rimm EB, Stampfer MJ, Ascherio A, Spiegelman D, Willett WC. Prospective study of major dietary patterns and risk of coronary heart disease in men. Am J Clin Nutr. 2000 Oct;72(4):912–21.

36. g.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://www.un.org/esa/population/pubsarchive/healthmort/g.pdf

37. Gupta PC, Mehta HC. Cohort study of all-cause mortality among tobacco users in Mumbai, India. Bull World Health Organ. 2000;78(7):877–83.

38. Berenson GS, Srnivasan SR, Bogalusa Heart Study Group. Cardiovascular risk factors in youth with implications for aging: the Bogalusa Heart Study. Neurobiol Aging. 2005 Mar;26(3):303–7.

39. Bao W, Threefoot SA, Srinivasan SR, Berenson GS. Essential hypertension predicted by tracking of elevated blood pressure from childhood to adulthood: The Bogalusa heart study. Am J Hypertens. 1995 Jul 1;8(7):657–65.

40. Dietary Pattern and Its Association with the Prevalence of Obesity and Related Cardiometabolic Risk Factors among Chinese Children [Internet]. [cited 2017 Oct 27]. Available from: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0043183

41. StrangesSeCVD-YoungFinnsStudy_12July2010_MPR_AGT (1).doc.

42. The State of the World's Children 1998 [Internet]. [cited 2017 Oct 27]. Available from: https://www.unicef.org/sowc98/

43. Hughes D. Nutrition and fitness: mental health, ageing, and the implementation of a healthy diet and physical activity lifestyle. Br J Sports Med. 2006 Nov;40(11):951.

44. Leclerc D, Sibani S, Rozen R. Molecular Biology of Methylenetetrahydrofolate Reductase (MTHFR) and Overview of Mutations/Polymorphisms [Internet]. Landes Bioscience; 2013 [cited 2017 Oct 27]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK6561/

45. Teo K, Chow CK, Vaz M, Rangarajan S, Yusuf S, PURE Investigators-Writing Group. The Prospective Urban Rural Epidemiology (PURE) study: examining the impact of societal influences on chronic noncommunicable diseases in low-, middle-, and high-income countries. Am Heart J. 2009 Jul;158(1):1–7.e1.

46. Full Text PDF [Internet]. [cited 2017 Oct 27]. Available from: http://bmjopen.bmj.com/content/bmjopen/4/10/e005138.full.pdf

47. PubMed entry [Internet]. [cited 2017 Oct 27]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/14710970

48. RER_HEALTH_PROMOTIONS.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://www.nlcahr.mun.ca/CHRSP/RER_HEALTH_PROMOTIONS.pdf

49. nnmbreport06nov20.pdf [Internet]. [cited 2017 Oct 27]. Available from: http://nnmbindia.org/nnmbreport06nov20.pdf

50. Kumar C, Haider S, Kashyap V. Prevalence of hypertension and its association with dietary practices in a rural area of Ranchi district of Jharkhand. Indian J Community Health. 2014 Dec 31;26(Supp 2):209–15.

51. WHO | STEPwise approach to surveillance (STEPS) [Internet]. WHO. [cited 2017 Oct 27]. Available from: http://www.who.int/chp/steps/en/

52. 1005.pdf [Internet]. [cited 2017 Oct 28]. Available from: http://www.ijcmph.com/index.php/ijcmph/article/viewFile/1242/1005

53. Redefiningobesity.pdf [Internet]. [cited 2017 Oct 28]. Available from: http://www.wpro.who.int/nutrition/documents/docs/Redefiningobesity.pdf

54. Alberti KGMM, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA, et al. Harmonizing the metabolic syndrome: a joint interim statement of the International

Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. Circulation. 2009 Oct 20;120(16):1640–5.

55. India - Household Consumer Expenditure, NSS 68th Round Sch1.0 Type 2: July 2011 - June 2012, Type - 2 - Overview [Internet]. [cited 2017 Oct 28]. Available from: http://mail.mospi.gov.in/index.php/catalog/145

Annexure 1: Study Information sheet (English)

You are in the village, which will be receiving the intervention: first /second

(to be filled by investigator while handing out this form)

What are Non-Communicable Diseases?

 The term **Non-Communicable Diseases** denotes a group of health conditions that result in long-term health consequences and most frequently create a need for long-term treatment and care. These conditions include cancers, cardiovascular diseases, diabetes and chronic lung illnesses. Chronic, non-communicable diseases (NCDs) are the number one cause of death and disability in the world. Many NCDs can be prevented by reducing common risk factors such as tobacco use, harmful alcohol use, physical inactivity and eating unhealthy diets.

Obesity is associated with increased total mortality and increased risk of disease or death from cardiovascular diseases, diabetes, and several types of cancer. It does so by increasing high blood pressure, blood cholesterol, insulin resistance.

EFFECTIVENESS OF DIETARY AWARENESS PROGRAM IN THE COMMUNITY:

 The cause for bad dietary habits at the community level is said to be mainly poor knowledge and decreased motivation. The aim of this study is to assess if providing the community with the knowledge that they might lack along with motivational activities over an extended period of time changes their food habits for the better. To do this study we will select 2 villages in Kaniyambadi block in Vellore. From each village we will select 130 women between the age of 30-40 and check their height, weight, blood pressure and also assess in detail their food habits by asking a number of questions. Blood will be collected from the selected women in all the four villages, to assess sugar and cholesterol levels. All those who have abnormal results will be advised what to do next. After that, one of the two villages will be selected for the next step.

This village will receive multiple levels of information about healthy food habits and how foods we eat lead to the diseases we acquire if not chosen smartly. For this purpose various modes of educational and motivational programs will be conducted in the form of training women from the village on healthy food and various methods to cook them. These trained volunteers will conduct cooking and education sessions for other women in the village. There will also be a 'Food Mela' where the villagers can cook healthy food and exhibit and will also contain exhibits of proper methods of choosing the food we eat. The other two villages will have a mass education program.

After two months, women of age 30-40 will be selected again from the 2 villages and they will again be checked for height, weight, blood pressure and reassessed about their food pattern or any change following the educational programs. The village that has not yet received the intervention during the study will receive further education at the end of the study. As a result, you might receive the intervention during or at the end of the study depending on which village you belong to. In addition, some women who were tested before the programmes started may not be tested after the programme while some of them may be tested again. As we are selecting women randomly this is unavoidable.

What the study participant is supposed to do: Kindly answer all the questions after thinking it out thoroughly. You are free to say that you are unaware of the answer to any questions you are asked. Do not make false answers to questions.

Important Information to the participant:

Participation in the study is totally voluntary and you are free to withdraw at any time, without giving any reason, without your medical care or legal rights being affected. Your identity will not be revealed in any information released to third parties or published. In case of any doubts regarding this study contact the Investigator using the below mentioned mobile number.

Department of Community Health

CMC Vellore

ஆய்வு விவரம்ப் பற்றிய படிவம்

<u>திட்டம் ஆரம்பிப்பதற்கு முன்</u>

உங்கள் கிராமத்திற்கு சுகாதர கல்வி திட்டம் உண்டு: முதல்/இரண்டாவது (இது ஆய்வாளரால் குறிக்கப்பட வேண்டியது.

தொற்றுப் பரவா நோய்கள் என்றால் என்ன?

நீண்டகால ஆரோக்கியமற்ற விளைவுகளையும் நீண்ட நாள் சிகிச்சை மற்றும் கவனிப்பு தேவைப்படும் உடல் நல குறைப்பாடுகள் தான் இந்த தொற்றுப் பரவா நோய்கள். இந்த உடல் நல குறைப்பாடுகளில் இதயம் சம்பந்தபட்ட நோய்கள் புற்றுநோய் சர்க்கரைநோய் மற்றும் நுரையீரல் சம்பந்தபட்ட நோய்கள் அடங்கும் உலகத்தில் ஏற்படும் இறப்பு மற்றும் செயல்பட முடியாத இயலாமைக்கு இந்த தொற்றுபரவா நோய்களே முதற்காரணமாக உள்ளது. புகைபிடிக்கும் பழக்கம் மது அருந்தும் பழக்கம் உடற்பயிற்சி இன்மை மற்றும் ஆரோக்கியமற்ற உணவு பழக்கம் ஆகியவற்றை தவிர்த்தால் இந்த தொற்றுபரவா நோய்களை நாம் தவிர்த்தால் உடல் பருமன் உயிருக்கு ஆபத்தை விளைவிப்பதுடன் இதய சம்பந்தமான நோய்கள் நீரழிவு நோய் மற்றும் பலவகையான புற்றுநோய் ஏற்படுவதற்கு உறுதுணையாக இருக்கின்றது இந்த உடல் பருமன் இரத்த கொதிப்பு இரத்ததில் கொழுப்பு மற்றும் இன்சுலின் செயல்படாமை மூலமாக மேற்கண்ட நோய்களை உருவாக்கிறது

உணவு பழக்கங்கள் பற்றிய விழிப்புணர்வு திட்டம்

சமுதாயத்தில் இம்மாதிரியான தரமற்ற உணவு பழக்கங்களுக்கு காரணம் இப்பழக்கத்தை பற்றிய குறைவான அறிவும் குறைவான ஊக்குவிப்புமாகும். இந்த ஆய்வின் நோக்கமே உணவு பழக்கவழக்கங்கள் பற்றிய அறிவையும் அதற்கான ஊக்குவிப்பு செயல்பாடுகளையும் சமுதாய அளவில் கொடுத்து பின்னர் அதனால் ஏற்படக்கூடிய சிறப்பான உணவு பழக்க வழக்க மாற்றங்களை மதீப்பீடு செய்வதுதான்.இந்த ஆய்விற்காக வேலூரை அடுத்த கன்னியம்பாடி ஒன்றியத்தி உள்ள நான்கு கிராமங்கள் தேர்ந்தெடுக்கப்பட்டது தேர்ந்தெடுக்கப் பட்ட ஒவ்வொரு கிராமத்திலும் 65 பெண்கள் (30 முதல் 40 வயது வரை) தேர்ந்தெடுக்கப்பட்டு அவர்களின் உயரம் எடை இரத்த அழுத்தம் அளவீடு செய்யப்படும் மற்றும் அவர்களின் உணவு பழக்கங்கள் பற்றி கேள்விகள் கேட்டு அறியப்படும் தேர்ந்தெடுக்கபட்ட பெண்களிடமிருந்து சர்க்கரை மற்றும் கொழுப்பு அளவை மதீப்பீடு செய்ய இரத்தம் எடுக்கப்படும் இந்த பரிசோதனையில் அசாதாரண அளவு உள்ளவர்களுக்கு அடுத்து என்ன செய்ய வேண்டும் என்று ஆலோசனை வழங்கப்படும் நான்கு கிராமங்களிலும் இது பற்றி பொது சுகாதார கல்வி வழங்கப்படும்.

அடுத்த கட்டமாக 2 கிராமங்களிலிருந்து 1 கிராமம் தேர்ந்தெடுக்கப்படும் இந்த இரண்டு கிராமங்களில் நல்ல ஆரோக்கியமான உணவு பழக்கங்கள் மற்றும் தரமற்ற உணவுகள் எவ்வாறு நோய்களை உருவாக்கும் என்ற செய்திகள் தெரிவிக்கப்படும் இதற்காக கல்வி மற்றும் ஊக்குவிப்பு நிகழ்ச்சிகள் நடத்தப்படும் இதற்காக பெண் தொண்டர்களுக்கு ஆரோக்கியமான உணவு மற்றும் அந்த உணவை தயாரிக்க தரமான சமையல் முறை பற்றி 4 பகுதிகளாக பயிற்சி அளிக்கப்படும் பயிற்சி பெற்ற இந்த பெண் தொண்டர்கள் கிராமத்தில் உள்ள மற்ற பெண்களுக்கு மாதம் இருமுறை பயிற்சி அளிப்பார்கள். உணவு திருவிழாவும் நடத்தப்படும் அதில் கிராம மக்கள்

ஆரோக்கியமான உணவுகளை சமைத்து காட்சிக்கு வைப்பார்கள் தவிர ஆரோக்கியமான தரமான சமையல் முறைகளையும் உணவுகளை காட்சியில் வைப்பார்கள்

இப்போது இந்த மாதிரியான செயல்முறை திட்டங்கள் 1 கிராமத்தில் செயல்பட்டு முடிவடைந்தபின் என்ன நன்மைகள் ஏற்பட்டுள்ளது என்பதை அறிய விரும்புகின்றோம் அதனால் 30 வயதுக்குமேல் 40 வயதிற்க்குள் உள்ள பெண்களை இந்த 2 கிராமங்களில் தேர்ந்தேடுத்து உயரம் எடை மற்றும் இரத்த அழுத்தம் எடுக்க இருக்கின்றோம் உணவு பழக்க வழக்கங்கள் மீண்டும் மதிப்பீடு செய்யப்படும்.

இந்த மாற்றங்களை இடையீடு செய்யப்படாத கிராமத்தின் மாற்றங்களோடு ஒப்பிட்டு பார்க்க போகின்றோம் இரண்டாவது பரிசோதனைக்கு பின் இடையீடு செய்யப்படாத கிராமதிற்க்கும் இதே மாதிரி உணவு பழக்கம் மற்றும் உணவு செய்யும் முறை பற்றி கல்வி மற்றும் பயிற்சி அளிக்கப்படும்.

இந்த திட்டத்திற்க்கு முன்னால் பரிசோதனை செய்யப்பட்ட பெண்கள் இம்முறை பரிசோதனைக்கு உட்படுத்தப்படாமலும் ஏற்கனவே பரிசோதிக்கப்படாத பெண்கள் இம்முறை பரிசோதனைக்கு உட்படுத்தப்படலாம். இது தவிர்க்க முடியாதது ஏன் என்றால் பெண்களை நாம் தேர்வு செய்யும் முறை அப்படி உள்ளது.

இத்திட்டம் செயல்படாத கிராமத்தில் நீங்கள் இருந்தால் கவலைப்பட வேண்டாம் உங்கள் கிராமத்திலும் இந்த செயல்பாடு திட்டங்கள் நடத்தப்படும்.

ஆய்விற்காக நபர் செய்ய வேண்டியது:-

எல்லா கேள்விகளுக்கும் யோசித்து பதில் அளிக்க வேண்டும் கேள்விக்கு பதில் தெரியவில்லை என்றால் தெரியவில்லை என்று தயங்காமல் சொல்லலாம்.

ஆய்விற்கான நபருக்கு முக்கிய செய்தி:

இந்த ஆய்வில் தாங்கள் முன்வந்து கலந்து கொள்வது மற்றும் எந்த நேரத்திலும் கலந்து கொள்ள மறுப்பது காரணம் சொல்லாமல் மறுப்பது உங்களின் மருத்துவ கவனிப்பு மாறாமல் சட்ட உரிமை மாறாமல் மறுப்பதற்கும் உரிமை உண்டு. உங்களை பற்றிய குறிப்பு எந்த செய்தியிலும் மூன்றாம் நபர் மத்தியில் தெரிவிக்கப்பட மாட்டாது. இந்த ஆய்வு பற்றிய சந்தேகம் தகவல் ஏதும் தெரிய வேண்டுமெனில் இந்த கைப்பேசி எண் உள்ள ஆய்வாளரிடம் தொடர்பு கொள்ளவும்

சமூகநல துறை
கிறுஸ்துவ மருத்துவ கல்லூரி. வேலூர்

Annexure 3: Informed Consent

Study Title: "Effectiveness of Dietary Intervention Program in the Community."

Study Number: [　　　]

Cell no: [　　　　　]

Date: [___/___/____]

Subject's Initials: _____ **Subject's Name:** _____

Date of Birth / Age: _____

(i)   I confirm that I have read and understood the information sheet dated for the above study and have had the opportunity to ask questions.

(ii)   I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

(iii) I understand that the Sponsor of the clinical trial, others working on the Sponsor's behalf, the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the trial. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published.

(iv)   I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).

(v)   I agree to take part in the above study.

(vi)   I agree to give blood samples when asked and to investigate on the bloods withdrawn from me and I agree for my height, weight and blood pressure to be measured.

Signature (or Thumb impression) of the Subject/Legally Acceptable

Signatory's Name: _____   Signature:

Or   Thumb impression:

Representative: _____
Date: ___/___/____
Signature of the Investigator: _____
Study Investigator's Name: _____

Signature or thumb impression of the Witness: _____
Date: ___/___/____
Name & Address of the Witness: _____

Annexure 4: Informed consent (Tamil)

ஆய்வில் பங்கேற்பவர்க்கான தகவலளிக்கப்பட்டதற்கான இணக்கப்படிவம்

ஆய்வு தலைப்பு: "சமூகத்தில் செய்யக்கூடிய உணவுமுறை அறிவுருத்தல் நிகழ்ச்சியின் பயன்பாடு".
ஆய்வு எண்:

தேதி:   **Cell no:**

பங்கேற்பவரின் தலைப்பெழுத்துக்கள்:
பங்கேற்பவரின் பெயர்:
பிறந்த தேதி ∴ வயது:

1. தேதியிட்ட மேல் சொல்லப்பட்ட ஆய்வுக்கான தகவல் படிவத்தை படித்து புரிந்துகொண்டேன் எனவும் கேள்விகேட்க எனக்கு வாய்ப்பளிக்கப்பட்டதெனவும் நான் உறுதி அளிக்கிறேன்.

2. இந்த ஆய்வில் எனது பங்கெடுப்பு தன்னிச்சையான செயல் எனவும் இந்த ஆய்விலிருந்து எந்த நேரத்திலும் எந்த காரணமும் அழிக்காமல் எனது மருத்துவ கவனிப்புக்கோ சட்ட உரிமைக்கோ எந்தவித பாதிப்புமின்றி விலகிக்கொள்ள எனக்கு முழு சுதந்திரம் உண்டு எனவும் எனக்கு புரிகிறது

3. நான் இந்த ஆய்விலிருந்து விலககிக்கொண்டாலும்ஒ இந்த ஆய்விற்கு வழங்குபவர்க்கோஒ அவர் சார்பில் வேலை பார்க்கும் மற்றவர்களுக்கோ நெறிமுறைகள் குழு மற்றும் ஒழுங்குமுறை ஆணையாளர்களுக்கோ எனது ஆவணங்களை இந்த ஆய்வின் காரணமாகவோ இது சம்மந்தமான கூடுதலான ஆராய்ச்சி காரணமாகவோ பார்வையிட எனது அனுமதி தேவையில்லை என்பது எனக்குப்புரிகிறது . இந்த அணுக்கத்திட்கு எனக்கு சம்மத. எனினும்ஒ எனது அடையாளம் மூன்றாம் நபர்களுக்கு தெரிவிக்கப்படும் எந்த தகவலிலும் வெளிப்படுத்தப்படவோ அல்லது பிரசுரிக்கப்படவோ மாட்டாது எனவும் எனக்கு புரிகிறது.

4. இந்த ஆய்விலிருந்து கிடைத்த தகவல் மற்றும் முடிவுகளின் பயன்பாடு அறிவியல் ஆராய்ச்சி நோக்கங்களில் இருக்கும் வரையில்ஒ நான் அதனை தடுக்காமலிருக்க சம்மதிக்கிறேன்.

5. நான் இந்த ஆய்வில் பங்கெடுக்க எனக்கு சம்மதம்.

6. இந்த ஆய்வின்பொழுது இரத்த பரிசோதனை செய்துகொள்ளவும் எனது உயரம் எடை போன்றவற்றை அளக்கவும் சம்மதிக்கிறேன்.

    பங்கேற்பவரின் கைய்யெழுத்து/பெருவிரல் அடையாளம்

தேதி: _____/_____/_____
கைய்யெழுததுட்டவர பெயர்: _____   கைய்யெழுத்து:
             அல்லது   பெருவிரல் அடையாளம்:
பிரதிநிதி: _____
ஆய்வாளரின் கைய்யெழுத்து:
ஆய்வாளரின் பெயர்:
சாட்சியின் கைய்யெழுத்து _____
பெருவிரல் அடையாளம்: _____
தேதி: _____/_____/_____

	Diet
	Smoking
	Alcohol
	physical

1.	Location and Date	
2.	ID Number	
3.	Village name	
4.	ID Number	
5.	Date of completion of the instrument	└─┴─┘ └─┴─┘ └─┴─┴─┴─┘

6.	Consent has been read and obtained	1.Yes 2.No If NO, END
7.	Interview Language	1.English 2.Tamil
8.	Time of interview	└─┴─┘ : └─┴─┘ hrs mins
9.	First Name: Husband/ Father Name:	

10.	Sex (Record Male / Female as observed)	Male 1 Female 2
11.	What is your date of birth?	Don't Know └──┴──┘ └──┴──┘ └───┴──┴───┘ ┘
12.	How old are you?	Years └──┴──┘
13.	In total, how many years have you spent at school and in fulltime study (excluding pre-school)?	Years └──┴──┘

14.	What is the highest level of education you have completed?	No formal schooling Less than primary school Primary school completed Secondary school completed High school completed College/University completed Post graduate degree	1 2 3 4 5 6 7
15.	What is your marital status?	Never married Currently married Separated Divorced Widowed Cohabitating Refused	1 2 3 4 5 6 7
16.	Which of the following best describes your main work status over the past 12 months?	Government employee Non-government employee Self-employed Non-paid Student Homemaker Retired Unemployed (able to work) Unemployed (unable to work) 100 Days Work (Specify)_____	1 2 3 4 5 6 7 8 9 10
17.	How many people older than 18 years, including yourself, live in your household?	Number of people 18 and above Less than 18	└┴┘ └┴┘

18.	Taking the past year, can you tell me what the average earnings of the household have been? (RECORD ONLY ONE, NOT ALL 3)	Per week └┴┴┴┴┴┴┘
		OR per month └┴┴┴┴┴┴┘
		OR per year └┴┴┴┴┴┴┘
		Refused

19. Does anybody in your family have NCDs (family history: Yes-----------------------------------specify

No

If yes who?

Duration:

	Question		Response	
20.	How important to you is lowering the rice in your diet?		Very important	1
			Somewhat important	2
			Not at all important	3
			Don't know	4
21.	Do you think that too much rice based in your diet could cause a health problem?		Yes	1
			No	2
			Don't know	3
22.	Do you know any food that protects against diabetes:		Yes	1
			No	2
			Don't know	3
23.	Do you know any food that protects you against heart disease:		Yes	1
			No	2
			Don't know	3
24.	Do you know which food protects you against cancer:		Yes	1
			No	2
			Don't know	3
25.	What do you think which food is unhealthy:		Yes	1
			No	2
			Don't know	3

26.	CORE: Diet		
	The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions, please think of a typical week in the last year.		
	Question	Response	
26a.	In a typical week, on how many days do you eat fruit?	Number of days ⌞_⌟	
26b.	How many servings of fruit do you eat on one of those days?	Number of servings ⌞_⌟	
26c.	In a typical week, on how many days do you eat vegetables?	Number of days ⌞_⌟	
26d.	How many servings of vegetables do you eat on one of those days?	Number of Servings ⌞_⌟	

27.	Dietary salt		
	With the next questions, we would like to learn more about salt in your diet. Dietary salt includes ordinary table salt, unrefined salt such as sea salt, iodized salt, salty stock cubes and powders, and salty sauces such as pickles or salty dried fish (see Showcard). The following questions are on adding salt to the food right before you eat it, on how food is prepared in your home, on eating processed foods that are high in salt such as [insert country specific examples], and questions on controlling your salt intake. Please answer the questions even if you consider yourself to eat a diet low in salt.		
27a.	How often do you add salt or a salty sauce such as soya sauce to your food right before you eat it or as you are eating it? (SELECT ONLY ONE)	Always 1 Often 2 Sometimes 3 Rarely 4 Never 5 Don't know 6	

27b.	How often is salt, salty seasoning or a salty sauce added in cooking or preparing foods in your household?	Always 1 Often 2 Sometimes 3 Rarely 4 Never 5 Don't know 6	
27c.	How often do you eat processed food high in salt? By processed food high in salt, I mean foods that have been altered from their natural state, such as packaged salty snacks, canned salty food including pickles and preserves, salty food prepared at a fast food restaurant, cheese, namkeen, mixtures and processed meat.	Always 1 Often 2 Sometimes 3 Rarely 4 Never 5 Don't know 6	
27d.	How much salt or salty sauce do you think you consume?	Far too much 1 Too much 2 Just the right amount 3 Too little 4 Far too little 5, Don't know 6	

	Do you do any of the following on a regular basis to control your salt intake? (RECORD FOR EACH)			
28a.	Limit consumption of processed foods {E.g: Mixture, boatie, vadaam, Maggie, kurkure etc..}		Yes 1 No 2	
28b.	Look at the salt or sodium content on food labels		Yes 1 No 2	
28c.	Buy low salt/sodium alternatives		Yes 1 No 2 Don't know 3	
28d.	Use spices other than salt when cooking		Yes 1 No 2 Not possible to replace 3	
28e.	Avoid eating foods prepared outside of a home		Yes 1 No 2	
28f.	Do other things specifically to control your salt intake		Yes 1 If Yes, go to other No 2	
	Other (please specify)	└─┴─┴─┴─┴─┴─┴─┘		

29.	The next questions ask about the oil or fat that is most often used for meal preparation in your home.		
29a.	What type of oil or fat is most often used for meal preparation in your household? (SELECT ONLY ONE)	Vegetable oil 1 Lard or suet 2 Butter or ghee 3 Dalda 4 Other 5 None in particular 6 None used 7 Don't know 8 Other └─┴─┴─┴─┴─┴─┴─┘	
29b.	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.	Number Don't know └─┴─┘	

30. **Household consumption of foods:**

These questions are about the amount used for your entire household for the last 30 days.
30a. How much salt did you use for the entire household in the last 30 days? ------------------kg
30b. How much sugar did you use for the household in the last 30 days------------kg?
30c. How much fruit was consumed for the household in the last 30 days? ------------kg
30d. How much was the vegetable consumption for the household for the last 30 days? ------------kg
30e. How much oil/fat did you use for the household for the last 30 days? ---------------litres
Types of oil/fat used: ……………………………………………

31. Physical Activity

	Travel to and from places		
31.	The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. [For example, to work, for shopping, to market, to place of worship]		
31a.	Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes 1 No 2	
	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days └─┘	
	How much time do you spend walking or bicycling for travel on a typical day?	Hours : └─┴─┘ : └─┴─┘ minutes hrs mins	
31b.	Do you do any additional exercise in your free time, to increase your activity e.g. walking fast, jogging, sports, aerobics etc. for at least 10 minutes continuously?	Yes If Yes Specify_____ No	
31c.	If yes, How many days a week/month do you do this.		
31d.	On a typical day when you exercise for how many minutes, do you do so?	─────── min	
31e.	When did you start doing this leisure time activity and why?	When___ Why___?	

32. Alcohol and Smoking

32a. Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes?
- Yes   1
- No   2 If No, go to skip

32b. Have you consumed any alcohol within the past 12 months?
- Yes   1
- No   2 if no skip entire

32c. During the past 30 days, how many times did you have four or more standard drinks in a single drinking occasion?
(120 ml of hard liquor)

Number of times------

<table>
<tr>
<td>1.</td>
<td>Reading</td>
<td>Systolic (mmHg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diastolic (mmHg)</td>
<td></td>
<td></td>
<td></td>
</tr>
</table>

- **Physical Measurements**
- **Blood Pressure**
- **Blood Lipids**
- **Blood Glucose**

1.	Reading	Systolic (mmHg)			
		Diastolic (mmHg)			
2.	Height	in Centimetres (cm) _____
3.	Weight	*in Kilograms (kg) _____*
4.	Waist circumference	*in Centimeters (cm) _____*
5.	Fasting blood glucose	*mg/dl _____*
6.	Total cholesterol	*mg/dl _____*
7.	Triglycerides	*mg/dl _____*
8.	HDL Cholesterol	*mg/dl _____*
9.	LDL Cholesterol	*mg/dl _____*

Annexure 6 : Questionnaire Tamil

1.	இடம் மற்றும் தேதி	பதில்
2.	கிராமம் ID	L__I__I__I__I__I__I
3.	கிராமம் பெயர்	
4.	நேர்காண்பவர் ID	L__I__I__I__I
5.	கருவி முடித்த தேதி	L__I__I__I L__I__I__I L__I__I__I__I

	ஒப்புதல், நேர்காணல், மொழி மற்றும் பெயர்	பதில்
6.	ஒப்புதல் வாசிக்கப்பட்டு பெறப்பட்டது	1. ஆம் 2. இல்லை இல்லை என்றால், முடிவு
7.	நேர்காணல் மொழி [மொழி புகுத்தவும்]	1. ஆங்கிலம் 2. தமிழ்
	நேர்காணல் நேரம் [24 மணி நேர கடிகார]	L__I__I : L__I__I hrs: mins
9.	முதல் பெயர்	

10.	பாலினம் (பார்வைக்கு ஆண்/பெண் என்று குறிக்கவும்)	ஆண் 1 பெண் 2
11.	நீங்கள் பிறந்த தேதி என்ன? தெரியாது	L__I__I L__I__I L__I__I__I__I dd mm year
12.	உங்களுக்கு எத்தனை வயது?	வருடங்கள் L__I__I

13.	மொத்தத்தில் எத்தனை வருடங்கள் நீங்கள் பள்ளியில் மற்றும் முழுநேர படிப்பில் நேரம் கழித்தீர்கள் (மழலையர் பள்ளி தவிர்த்து)?	வருடங்கள் └─┴─┘

14.	நீங்கள் முடித்த மிக அதிக அளவு படிப்பு என்ன?	சரியான பள்ளிப் படிப்பு இல்லை	1
		தொடக்கக்கல்வியை விடக்குறைவாக	2
		தொடக்கப் பள்ளி முழுமையுற்ற	3
		நடுநிலைப் பள்ளி முழுமையுற்ற	4
		மேல்நிலைப் பள்ளி முழுமையுற்ற	5
		கல்லூரி / பல்கலைக்கழகம் முழுமையுற்ற	6
		பட்டப்படிப்பு	7
15.	உங்கள் திருமண நிலை என்ன?	திருமணம் ஆனதில்லை	1
		தற்போது திருமணம் ஆன	2
		பிரிந்து வாழ்தல்	3
		விவாகரத்தான	4
		விதவை	5
		சேர்ந்து வாழ்தல்	6
		மறுத்த	7
16.	கொடுக்கப்பட்டுள்ளவற்றுள் எது கடந்த 12 மாதங்களில் உங்கள் முக்கிய வேலையை மிகச்சரியாக விவரிக்கிறது?	அரசு ஊழியர்	1
		தனியார் ஊழியர்	2
		சுயதொழில்	3
		வருமானமற்ற	4
		மாணவர்	5
		இல்லத்தரசி	6
		ஓய்வுபெற்ற	7
		வேலையில்லா (வேலை செய்ய முடிந்த)	8
		வேலையில்லா (வேலை செய்ய முடியாத)	9
		மறுத்த	88
17.	உங்கள் குடும்பத்தில் நீங்கள் உட்பட 18 வயதிற்கு மேற்பட்டோர் எத்தனை பேர் வாழ்கின்றனர்?	எத்தனை மக்கள் └─┴─┘	

18.	கடந்த வருடத்தை எடுத்துக் கொண்டு, உங்கள் குடும்பத்தின் சராசரி வருமானம் என்னவாக இருந்ததென்று என்னிடம் சொல்ல முடியுமா? (ஒன்றை மட்டும் பதிவு செய்யவும், மூன்றையும் அல்ல)	வாரத்திற்கு └─┴─┴─┴─┴─┴─┘ செல்லவும் அல்லது மாதத்திற்கு └─┴─┴─┴─┴─┴─┘ அல்லது வருடத்திற்கு └─┴─┴─┴─┴─┴─┘ மறுத்த

19. உங்கள் குடும்பத்தில் யாருக்காவது தொற்றாத வியாதிகள் உண்டா?

ஆம்
இல்லை

ஆம் என்றால், யார்?

எவ்வளவு காலம்:

	கேழ்வி	பதில்
20.	உங்கள் உணவில் அரிசியைக் குறைப்பது உங்களுக்கு எவ்வளவு முக்கியம் என்று நினைக்கிறீர்கள்	மிக முக்கியம் 1 ஏதோ முக்கியம் 2 சுத்தமாக முக்கியமில்லை 3 தெரியாது 4
21.	உங்கள் உணவில் மிக அதிக அரிசி சார்ந்த உணவு உடல்நலக்கேடுகளை விளைவிக்கும் என்று நினைக்கிறீர்களா?	ஆம் 1 இல்லை 2 தெரியாது 3
22.	சர்க்கரை நோயிலிருந்து பாதுகாக்கும் ஏதேனும் உணவு உங்களுக்குத் தெரியுமா:	

23.	இருதய நோயிலிருந்து பாதுகாக்கும் ஏதேனும் உணவு உங்களுக்குத் தெரியுமா:	
24.	புற்று நோயிலிருந்து பாதுகாக்கும் ஏதேனும் உணவு உங்களுக்குத் தெரியுமா:	
25.	எந்த உணவு உடல்நலக்கேடு என்று நீங்கள் நினைக்கிறீர்கள்:	

	முக்கியப்பகுதி : உணவு		
26.	இனி வரும் கேள்விகள் நீங்கள் எப்பொழுதும் உண்ணும் பழங்கள் மற்றும் காய்களைப்பற்றி கேட்கும். இங்கு கிடைக்கும் பழங்கள் மற்றும் காய்கறிகளுக்கான உதாரணம் கொண்ட உணவு அட்டை என்னிடம் உள்ளது. ஒவ்வொரு படமும் ஒரு உண்ணும் அளவைக் குறிக்கவும். இந்த கேள்விகளுக்கு பதிலளிக்கும்போது கடந்த வருடத்தில் எப்போதும் போலுள்ள ஒரு வாரத்தை தயவுகூர்ந்து நினைத்துக்கொள்ளவும்.		
26a.	எப்போதும் போலுள்ள ஒரு வாரத்தில் எத்தனை நாட்கள் பழங்கள் சாப்பிடுவீர்கள் ?	நாட்களின் எண்ணிக்கை தெரியாது	
26b.	அவற்றுள் ஒரு நாளில் எத்தனை முறை நீங்கள் பழங்கள் சாப்பிடுவீர்கள் ?	எத்தனை முறை தெரியாது	
26c.	எப்போதும் போலுள்ள ஒரு வாரத்தில் எத்தனை நாட்கள் காய்கறிகள் சாப்பிடுவீர்கள் ?	நாட்களின் எண்ணிக்கை தெரியாது	
26d.	அவற்றுள் ஒரு நாளில் எத்தனை முறை நீங்கள் காய்கறிகள் சாப்பிடுவீர்கள்? (காட்சி அட்டை பயன்படுத்தவும்)	நாட்களின் எண்ணிக்கை தெரியாது	
27.	உணவில் உப்பு		
	அடுத்து வரும் கேள்விகளில் உங்கள் உணவில் உள்ள உப்பைக் பற்றி தெரிந்து கொள்ள விரும்புகிறோம். உணவில் உள்ள உப்பு என்பது , கல்லுப்பு, தூளுப்பு, ஐயோடின் கொண்ட உப்பு மற்றும் உப்புள்ள சோயா சாஸ் மற்றும் போன்றவற்றைக் குறிக்கும். (காட்சி அட்டை பார்க்கவும்). இனி வரும் கேள்விகள் நீங்கள் உண்ணுவதற்கு சற்று முன்னதாக சேர்க்கும் உப்பு, எப்படி வீட்டில் உணவு தயாரிக்கப்படுகிறது என்பது பற்றியும், உப்பு அதிகமுள்ள பதப்படுத்தப்பட்ட உணவை உண்பது பற்றியும் write examples , மற்றும் உங்கள் உணவில் உப்பைக் கட்டுப்படுத்துவது பற்றியதும் ஆகும். நீங்கள் உப்பு குறைவான உணவை உண்பதாக நீங்கள் நினைத்தாலும் கேழ்விகளுக்கு பதிலளிக்கவும்.		
27a.	நீங்கள் உண்ணுவதற்கு சற்று முன்னரோ அல்லது உண்ணும்பொழுதோ நீங்கள் உணவில் எவ்வளவு அடிக்கடி சோயா சாஸ் போன்ற உப்பு, அல்லது உப்புள்ள குழம்பினை சேர்ப்பீர்கள்? (ஒன்றை மட்டும் தேர்வு செய்யவும்)	எப்பொழுதும் 1 அடிக்கடி 2 சிலசமயம் 3 அபூர்வமாக 4 எப்போதுமில்லை 5 தெரியாது 6	

27b.	உங்கள் வீட்டில் சமையலில் அல்லது தயாரிக்கப்படும் உணவில் எவ்வளவு அடிக்கடி உப்பு, உப்புள்ள பொடிகள் அல்லது குழம்பினை சேர்ப்பீர்கள்?	எப்பொழுதும் 1 அடிக்கடி 2 சிலசமயம் 3 அபூர்வமாக 4 எப்போதுமில்லை 5 தெரியாது 6	
27c.	உப்பு அதிகமுள்ள பதப்படுத்தப்பட்ட உணவை எவ்வளவு அடிக்கடி உண்ணுவீர்கள்? உப்பு அதிகமுள்ள பதப்படுத்தப்பட்ட உணவு என்பது பாக்கெட் செய்யப்பட்ட உணவுகள், கேன்களில் கிடைக்கும் அதிக உப்புள்ள ஊறுகாய்கள் மற்றும் பதப்படுத்தப்பட்டவை அவசர சிற்றுண்டி விடுதிகளில் கிடைக்கும் சீஸ், போன்ற தம் இயற்கை தன்மையிலிருந்து மாறிய உணவுகளைக் குறிக்கும். [நாட்டிற்குக் குறிப்பான பிரிவுகளைப் புகுத்தவும்] [உதாரணங்களை புகுத்தவும்]	எப்பொழுதும் 1 அடிக்கடி 2 சிலசமயம் 3 அபூர்வமாக 4 எப்போதுமில்லை 5 தெரியாது 6	
27d.	�…வளவு உப்பு அல்லது உப்புள்ள குழம்பை உட்கொள்கிறீர்கள் என்று நினைக்கிறீர்கள்?	மிக மிக அதிகம் 1 மிக அதிகம் 2 மிகச்சரியான அளவு 3 மிக குறைவு 4 மிக மிகக் குறைவு 5 தெரியாது 6	

	கேழ்வி	பதில்
27e.	உங்கள் உணவில் உப்பைக் குறைப்பது எவ்வளவு முக்கியம் என்று நினைக்கிறீர்கள்?	மிக முக்கியம் 1 ஏதோ முக்கியம் 2 சுத்தமாக முக்கியமில்லை 3 தெரியாது 4
27f.	உங்கள் உணவில் மிக அதிக உப்பு மற்றும் உப்புள்ள குழம்பு உடல்நலக்கேடு விளைவிக்கும் என்று நினைக்கிறீர்களா?	ஆம் 1 இல்லை 2 தெரியாது 3
28.	கீழ் கொடுக்கப்பட்டுள்ளவற்றுள் எதனையாவது உங்களது உப்பு பயன்பாட்டைக் குறைக்கத் தொடர்ச்சியாக செய்கிறீர்கள் : (ஒவ்வொன்றிட்கும் பதிவு செய்யவும்)	
28a.	பதப்படுத்தப்பட்ட உணவுப் பயன்பாட்டைக் கட்டுப்படுத்துவது	ஆம் 1 இல்லை 2

28b.	உணவு பொருள் மேலுள்ள தாளின்மேல் உப்பு மற்றும் சோடியம் அளவைப் பார்ப்பது	ஆம் 1 இல்லை 2
28c.	குறைந்த உப்பு /சோடியம் உள்ள மாற்றுப் பொருளை வாங்குவது	ஆம் 1 இல்லை 2
28d.	சமைக்கும் பொழுது உப்பில்லாது மற்ற மசாலாக்களைப் பயன்படுத்துவது	ஆம் 1 இல்லை 2
28e.	ஒரு வீட்டிற்கு வெளியே தயாரித்த உணவை உண்ணாது தவிர்ப்பது	ஆம் 1 இல்லை 2
28f.	குறிப்பாக உணவுப் பயன்பாட்டைக் கட்டுப்படுத்த மற்ற காரியங்களைச் செய்வது மற்றவை (தயவுசெய்து குறிப்பிடவும்)	ஆம் 1 ஆம் என்றால், மற்றவைக்குச் செல்லவும் இல்லை 2 └──┴──┴──┴──┴──┴──┴──┘
29.	அடுத்து வரும் கேள்விகள் நீங்கள் உங்கள் வீட்டில் அடிக்கடி உணவு தயாரிக்க எந்த வகை எண்ணெய் அல்லது கொழுப்பைப் பயன்படுத்துவீர்கள் மற்றும் வீட்டிற்கு வெளியே உணவுகளைப் பற்றியதுமாகும்.	

| 29a. | உணவு தயாரிக்க எந்த வகை எண்ணெய் அல்லது கொழுப்பு உங்கள் வீட்டில் பயன்படுத்தப்படுகிறது?

(ஒன்று மட்டும் தேர்வு செய்யவும்) | சமயலெண்ணெய்
பன்றிக்கொழுப்பு
வெண்ணெய்
அல்லது
நெய்செயற்கை
வெண்ணெய்
மற்றவை
குறிப்பாக ஒன்றும் இல்லை
எதுவும் பயன்படுத்துவதில்லை

தெரியாது

மற்றவை | 1
2
3

4
5
6

7
மற்றவை என்றால் செல்லவும்

8

⌊_⌊_⌊_⌊_⌊_⌊_⌋ |
| 29b. | சுமாராக ஒரு வாரத்திற்கு எத்தனை வேளை ஒரு வீட்டில் தயாரிக்கப்படாத உணவை உண்ணுவீர்கள்? உணவி என்னும்போது காலை, மாலை மற்றும் இரவு உணவைக் குதிக்கிறேன். | எண் தெரியாது | ⌊__⌋ |

30. குடும்ப உணவுப் பயன்பாடு:

இந்த கேள்விகள் கடந்த 30 நாட்களில் உங்கள் மொத்த குடும்பத்திற்கு பயன்படுத்தப்பட்ட அளவைப் பற்றியதாகும்.

30a. கடந்த 30 நாட்களில் உங்கள் மொத்த குடும்பத்திற்கு எவ்வளவு உப்பு பயன்படுத்தினீர்கள்? _____கிலோ

30b. கடந்த 30 நாட்களில் உங்கள் மொத்த குடும்பத்திற்கு எவ்வளவு சர்க்கரை பயன்படுத்தினீர்கள்? _____கிலோ

30c. கடந்த 30 நாட்களுக்கு உங்கள் குடும்பத்திற்கு எவ்வளவு பழங்கள் பயன்பட்டது?_____கிலோ

30d. கடந்த 30 நாட்களுக்கு உங்கள் குடும்பத்திற்கு எவ்வளவு காய்கறிகள் பயன்பட்டது?_____கிலோ

30e. கடந்த 30 நாட்களுக்கு உங்கள் குடும்பத்திற்கு எண்ணை /கொழுப்பு எவ்வளவு பயன்படுத்தினீர்கள்? _____லிட்டர்கள்

பயன்படுத்தப்படும் எண்ணை /கொழுப்பு வகை:⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯.

1.

2.

3.

4.

5.

31. உடல் செயற்பாடு

31a. நீங்கள் குறைந்தது 10 நிமிடமாவது நடப்பது அல்லது சைக்கிள்   ஓட்டுவீர்களா?

- ஆம் இல்லை
- ஆம் என்றால் வாரத்திற்கு எத்தனை நாள்
- நாளுக்கு எத்தனை நிமிடம்

31b. நீங்கள் வேறு ஏதேனும் தினசரி உடற்செயற்பாடு செய்கிறீர்களா?

- ஆம், என்ன ....
- இல்லை

Annexure 7: IRB approval letter

INSTITUTIONAL REVIEW BOARD (IRB)
CHRISTIAN MEDICAL COLLEGE, VELLORE, INDIA

Ethics Committee Registration No: ECR/326/INST/TN/2013 issued under Rule 122D of the Drugs & Cosmetics Rules 1945, Govt. of India

Dr. George Thomas, M.B.B.S., D. Ortho., Ph.D.,
Chairperson, Ethics Committee

Dr. L. Jeyaseelan, M.Sc., Ph.D., FSMS, FRSS.,
Secretary, Research Committee

Prof. Keith Gomez, B.Sc., MA (S.W), M.Phil.,
Deputy Chairperson, Ethics Committee

Dr. Anna Benjamin Pulimood, M.B.B.S., MD., Ph.D.,
Chairperson, Research Committee & Principal

Dr. Biju George, M.B.B.S., MD., DM.,
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

Ref: IRB – A7 - 23.08.2017

September 04, 2017

Dr. Madhu Mohan,
Department of Community Medicine,
Christian Medical College,
Vellore 632 002

Ref: 1. IRB: 9933 dated: 17.02.2016

Dear Dr. Madhu Mohan,

The Institutional Review Board (Silver, Research and Ethics Committee) of the Christian Medical College, Vellore, reviewed and discussed the following amendment for the study titled "Effectiveness of a community based dietary awareness program in a rural block of Vellore" on August 23rd 2017.

(1) Instead of four villages (two intervention and two controls) as mentioned before we will be, taking two villages (one intervention, one control) due to insufficient volunteers. However, the sample size will remain the same

The following Institutional Review Board (Silver, Research & Ethics Committee) members were present at the meeting held on August 23rd 2017 at 9.45 am in the BRTC Conference Room, Christian Medical College, Bagayam, Vellore 632002.

Name	Qualification	Designation	Affiliation
Dr. George Thomas	MBBS, D Ortho, PhD	Orthopaedic Surgeon, St. Isabella Hospital, Chennai, Chairperson, Ethics Committee, IRB, Chennai	External, Clinician
Dr. L. Jeyaseelan	MSc, PhD, FSMS, FRSS	Professor, Biostatistics, Secretary (Research Committee), IRB, CMC, Vellore	Internal, Statistician
Rev. Dr. T. Arul Dhas	MSc, BD, DPC, PhD(Edin)	Chaplaincy Department, CMC, Vellore	Internal, Social Scientist
Dr. Anuradha Bose	MBBS, DCH, MD,MRCP, FRCPCH	Professor, Community Medicine, CMC, Vellore	Internal, Clinician

1 of 3

Ethics Committee Silver, Office of Research, I Floor, Carman Block, Christian Medical College, Vellore, Tamil Nadu 632 002
Tel: 0416 – 2284294, 2284202   Fax: 0416 – 2262788   E-mail: research@cmcvellore.ac.in

02

OFFICE OF RESEARCH
INSTITUTIONAL REVIEW BOARD (IRB)
CHRISTIAN MEDICAL COLLEGE, VELLORE, INDIA

Ethics Committee Registration No: ECR/326/INST/TN/2013 issued under Rule 122D of the Drugs & Cosmetics Rules 1945, Govt. of India

Dr. George Thomas, M.B.B.S., D. Ortho., Ph.D.,
Chairperson, Ethics Committee

Dr. L. Jeyaseelan, M.Sc., Ph.D., FSMS, FRSS.,
Secretary, Research Committee

Prof. Keith Gomez, B.Sc., MA (S.W), M.Phil.,
Deputy Chairperson, Ethics Committee

Dr. Anna Benjamin Pulimood, M.B.B.S., MD., Ph.D.,
Chairperson, Research Committee & Principal

Dr. Biju George, M.B.B.S., MD., DM.,
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

Name	Qualifications	Position	Category
Dr. Jayaprakash Muliyil	BSc, MBBS, MD, MPH, Dr PH (Epid), DMHC	Retired Professor, Vellore	External, Scientist &Epidemiologist
Dr. Biju George	MBBS, MD, DM	Professor, Haematology, Additional Vice Principal (Research), Deputy Chairperson (Research Committee), Member Secretary (Ethics Committee), IRB, CMC, Vellore.	Internal, Clinician
Dr. Prasanna Samuel	MSc, PhD	Lecturer, Biostatistics, CMC, Vellore	Internal, Statistician
Prof. Keith Gomez	BSc, MA (S.W), M. Phil (Psychiatry Social Work)	Student counselor, Loyola College, Chennai, Deputy Chairperson, Ethics Committee, IRB	External, Lay Person & Social Scientist
Dr. P. Zachariah	MBBS, PhD	Retired Professor, Vellore	External, Clinician
Dr. D. J. Christopher	BSc, MBBS, DTCD DNB, FRCP(Glasg), FCCP(USA)	Professor, Pulmonary Medicine, CMC, Vellore	Internal, Clinician
Mr. C. Sampath	BSc, BL	Advocate, Vellore	External, Legal Expert
Mr. Samuel Abraham	MA, PGDBA, PGDPM, M. Phil, BL.	Sr. Legal Officer, CMC, Vellore	Internal, Legal Expert
Dr. Vinitha Ravindran	PhD (Nursing)	Professor & Addl. Deputy Dean, College of Nursing, CMC, Vellore	Internal, Nurse
Dr. Suresh Devasahayam	BE, MS, PhD	Professor of Bio-Engineering, CMC, Vellore	Internal, Basic Medical Scientist
Dr. Sathya Subramani	MD, PhD	Professor, Physiology, CMC, Vellore	Internal, Clinician
Mrs. Pattabiraman	BSc, DSSA	Social Worker, Vellore	External, Lay Person

IRB: 9933 dated: 17.02.2016

2 of 3

Ethics Committee Silver, Office of Research, I Floor, Carman Block, Christian Medical College, Vellore, Tamil Nadu 632 002
Tel: 0416 – 2284294, 2284202   Fax: 0416 – 2262788   E-mail: research@cmcvellore.ac.in

03

Ethics Committee Registration No: ECR/326/INST/TN/2013 issued under Rule 122D of the Drugs & Cosmetics Rules 1945, Govt. of India

Dr. George Thomas, M.B.B.S., D. Ortho., Ph.D.,
Chairperson, Ethics Committee

Dr. L. Jeyaseelan, M.Sc., Ph.D., FSMS, FRSS.,
Secretary, Research Committee

Prof. Keith Gomez, B.Sc., MA (S.W), M.Phil.,
Deputy Chairperson, Ethics Committee

Dr. Anna Benjamin Pulimood, M.B.B.S., MD., Ph.D.,
Chairperson, Research Committee & Principal

Dr. Biju George, M.B.B.S., MD., DM.,
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

Dr. AbhayGahukamble	MS, D Ortho, DNB(Ortho)	Associate Professor, Paediatric Orthopaedics, CMC, Vellore	Internal, Clinician
Dr. Ashish Goel	MBBS, MD, DM	Professor, Hepatology, CMC, Vellore	Internal, Clinician
Mrs. Ruma Nayak	M Sc (Nursing)	Professor, Head of Paediatric Nursing & Deputy Nursing Superintendent, College of Nursing, CMC, Vellore	Internal, Nurse

We approve the above amendment as presented.

Yours sincerely,

Dr. L Jeyaseelan
Secretary (Research Committee)
Institutional Review Board.

IRB: 9933 dated: 17.02.2016

3 of 3

Ethics Committee Silver, Office of Research, I Floor, Carman Block, Christian Medical College, Vellore, Tamil Nadu 632 002
Tel: 0416 – 2284294, 2284202   Fax: 0416 – 2262788   E-mail: research@cmcvellore.ac.in

04

Annexure 8: IRB amendment approval

INSTITUTIONAL REVIEW BOARD (IRB)
CHRISTIAN MEDICAL COLLEGE, VELLORE, INDIA

Ethics Committee Registration No: ECR/326/INST/TN/2013 issued under Rule 122D of the Drugs & Cosmetics Rules 1945, Govt. of India

Dr. George Thomas, D Ortho Ph.D.
Chairperson, Ethics Committee

Dr. B. Antonisamy, M.Sc., Ph.D., FSMS, FRSS.
Secretary, Research Committee

Prof. Keith Gomez, B.Sc., MA (S.W), M.Phil.
Deputy Chairperson, Ethics Committee

Dr. Alfred Job Daniel, D Ortho MS Ortho DNB Ortho.
Chairperson, Research Committee & Principal

Dr. Biju George, MBBS., MD., DM
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

September 19, 2016

Dr. Madhu Mohan. S,
P G Registrar,
Department of Community Medicine,
Christian Medical College,
Vellore 632 004.

Sub: **Fluid Research Funding: New Proposal**
Effectiveness of a community based dietary awareness program in a rural block of Vellore
Dr. Madhu Mohan. S (Employment Number: 33307), , PG Registrar, MD Community Medicine, Dr. Anu Mary Oommen , Associate Professor, Community Health, Dr. Kuryan George (Emp. No. 08947), Community Health, Dr. Jasmine Helen (Emp.No 20080), Community Health, Dr Shalini, Community Health.

Ref: IRB Min No: 9933 [INTERVEN] dated 17.02.2016

Dear Dr. Madhu Mohan. S,

I enclose the following documents:-

1. Institutional Review Board approval   2.   Agreement

Could you please sign the agreement and send it to Dr. Biju George, Addl. Vice Principal (Research), so that the grant money can be released.

With best wishes,

Dr. Biju George
Secretary (Ethics Committee)
Institutional Review Board

Dr. BIJU GEORGE
MBBS., MD., DM.
SECRETARY - (ETHICS COMMITTEE)
Institutional Review Board,
Christian Medical College, Vellore - 632 002.

Cc: Dr. Anu Mary Oommen, Department of Community Medicine, CMC, Vellore.

1 of 5

Ethics Committee Silver, Office of Research, I Floor, Carman Block, Christian Medical College, Vellore, Tamil Nadu 632 002
Tel: 0416 – 2284294, 2284202   Fax: 0416 – 2262788   E-mail: research@cmcvellore.ac.in

05

OFFICE OF RESEARCH
INSTITUTIONAL REVIEW BOARD (IRB)
CHRISTIAN MEDICAL COLLEGE, VELLORE, INDIA

Ethics Committee Registration No: ECR/326/INST/TN/2013 issued under Rule 122D of the Drugs & Cosmetics Rules 1945, Govt. of India

Dr. George Thomas, D Ortho Ph.D.
Chairperson, Ethics Committee

Dr. B. Antonisamy, M.Sc., Ph.D., FSMS, FRSS.
Secretary, Research Committee

Prof. Keith Gomez, B.Sc., MA (S.W), M.Phil.
Deputy Chairperson, Ethics Committee

Dr. Alfred Job Daniel, D Ortho MS Ortho DNB Ortho.
Chairperson, Research Committee & Principal

Dr. Biju George, MBBS., MD, DM
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

Dr. Vinod Joseph Abraham	MBBS, MD, MPH	Professor, Community Medicine, CMC, Vellore	Internal, Clinician
Dr. Molly Jacob	MBBS, MD, PhD	Professor, Biochemistry, CMC, Vellore	Internal, Clinician
Mr. C. Sampath	BSc, BL	Advocate, Vellore	External, Legal Expert
Mrs. Pattabiraman	BSc, DSSA	Social Worker, Vellore	External, Lay person
Mrs. Ruma Nayak	M Sc (Nursing)	Professor, Head of Paediatric Nursing & Deputy Nursing Superintendent, College of Nursing, CMC, Vellore	Internal, Nurse
Dr. VinithaRavindran	PhD (Nursing)	Professor & Addl. Deputy Dean, College of Nursing, CMC,	Internal, Nurse
Dr. Shirley David	MSc, PhD	Professor, Head ofFundamentals Nursing Department, College of Nursing, CMC, Vellore	Internal, Nurse

We approve the project to be conducted as presented.

The Institutional Ethics Committee expects to be informed about the progress of the project, any **adverse events** occurring in the course of the project, any **amendments in the protocol and the patient information / informed consent**. On completion of the study you are expected to submit a copy of the **final report**. Respective forms can be downloaded from the following link:

http://172.16.11.136/Research/IRB_Polices.html in the CMC Intranet and in the CMC website link address: http://www.cmch-vellore.edu/static/research/Index.html.

Kindly provide the total number of patients enrolled in your study and the total number of withdrawals for the study entitled: "Effectiveness of a community based dietary awareness program in a rural block of Vellore" on a monthly basis. Please send copies of this to the Research Office(research@cmcvellore.ac.in)

IRB Min No: 9933 [INTERVEN] dated 17.02.2016

4 of 5

Ethics Committee Silver, Office of Research, I Floor, Carman Block, Christian Medical College, Vellore, Tamil Nadu 632 002
Tel: 0416 – 2284294, 2284202   Fax: 0416 – 2262788   E-mail: research@cmcvellore.ac.in

06